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Contractors and Engineers Monthly

Vol. 35, No. 7 JULY, 1938 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Raising Sunken Pavement**
  What to do about settled concrete pavements has been answered successfully in Missouri by the use of mud-pumping. Two of Missouri's highway engineers discuss the methods used for this maintenance work and give data on costs of drilling and pumping.
  See page 2.

- **Concreting at Imperial Dam**
  The methods of handling the aggregates and concrete for the spillway of Imperial Dam in Arizona, part of the Bureau of Reclamation's huge irrigation project which includes the All-American Canal, are described in this issue.
  See page 2.

- **Repairing Levee Breaks**
  The floods of last year left in their wake considerable damage to some of the levees along the Mississippi. The use of hydraulic fill to restore two damaged sections below Cairo, Ill., by the U. S. Engineer Department is described in this issue.
  See page 2.

- **Arkansas Road Mix**
  As a result of experimental work with road mix using dense graded aggregate during 1937, already described in previous articles, Arkansas adopted a type of asphalt and a standard practice for building this type of road.
  See page 5.

- **Baton Rouge Bridge**
  Louisiana is building a 12,211-foot combined railroad and highway bridge across the Mississippi River about 3 miles north of Baton Rouge, at a cost of $9,000,000.
  See page 9.

- **Storm Sewer on State Highway**
  High-pressure water mains, sanitary sewers, telephone cables and a new water line complicated the excavation for a large storm sewer on McKeesport's Fifth Avenue where Crooked Run Creek had often run rampant. Concrete for the structure was pumped to the forms from a central plant and a new state highway was laid on top of the long culvert.
  See page 15.

IN THIS ISSUE

Bridges	4, 9
Bulletins and Pamphlets	30, 31
Cartoon	4
County Road Work	1
Culvert Construction	15
Dam Construction	2
Editorial	4
Federal Aid	4
Grade Separations	1
Grading	19
Highway Lighting	24
Highway Maintenance	2
Legal Decisions	32
Levees	2
Road Mix	1, 5
Tunnel Construction	18
Wire Rope Service	22

Road-Mix Surface Tax-Money Saver

Skin Coat of Road Mix Sheds Water, Stops Dust and Keeps Gravel on the Road

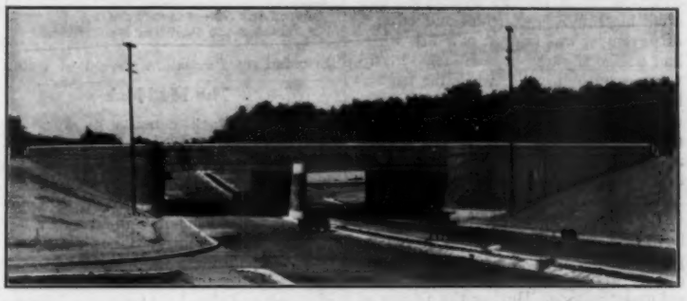
✦ EVEN a skin coat of road mix on a solid primed base is a great protection to road tax money, according to John W. Alter, County Engineer of Muskingum County, Ohio. "I'll tell you how I make sure the base is solid," said Mr. Alter during our discussion of better bases for thin surface treatment. "If a road doesn't break through during a bad winter and spring then I know it is O.K. for surfacing."

The method used for surfacing a base is interesting, but the "bases" of this story go back more than one or two winters of testing by Mother Nature. Most of the roads are gravel and have been in service for from 5 to 10 years, insuring compact subgrades, for in that time frost boils and weak spots have had plenty of time to make themselves known.

Mr. Alter makes a personal inspection of the road to be treated and if he finds that there is a surplus of fine material, earth, in the surface he instructs the crew working on that road to blade the excess fines to the side and has some coarser material hauled in. In any case all loose material is bladed back off the road to a width of 24 feet, leaving the center wide open for the prime. The prime is a road oil with about 50 per cent asphalt and it is shot 18 feet wide at the rate of 0.3 gallon per square yard, but if the material is open with an excess of coarse material the prime is increased slightly.

The loose material that was bladed to the side is then brought back with a 12-foot power patrol grader and spread uniformly over the full 18-foot width

(*Continued on page 14*)



Massachusetts Builds Brick-Veneer Bridge At Grade Crossing

Structure Includes Garage For Trucks and Snow Plows, Built by E. H. Lewis on Circumferential Highway

✦ WHERE the Northern Circumferential Highway, Mass. Route 128, crosses the Newburyport Turnpike, U. S. Route 1, in Lynnfield, Mass., the first brick-veneer grade-separation structure built by the Massachusetts Division of Highways was completed last autumn as part of WPMH 272-B, including 3.950 miles of bituminous concrete highway with two 32-foot roadways and a 16-foot center grass plot.

With an ideal foundation of hard gravel, no piles for the structure were required. The concrete foundation was laid directly on the gravel for the three-span structure. Two of the spans are for the roadways and the third provides a spacious garage, with three 12-foot steel rolling lift doors, for the storage of trucks, snow-plow equipment, and materials. Each span is 40 foot long, providing for the two 32-foot roadways with outer 5-foot sidewalks on each side and an 8-foot concrete center strip.

Five piers carry a continuous concrete beam for the support of the continuous I-beam stringers which are 32 inches deep and carry an 8-inch concrete deck. The outside stringers are arched steel-plate girders encased in concrete. The end piers of the structure and the abutments are curved as are also the granite tops to the collision walls at the ends. The spandrel wall across the structure carries a diamond pattern made with the brick. The uniformity of the color of the brick prevented any variety of color to accentuate the pattern but it makes a very attractive addition to the landscape and is unusual in the use of the brick veneer which is seldom applied to a structure where the public can see and appreciate it.

The outer parts of most bridges are beauty unsung, as for instance the hand-cut masonry of the bridges on the Mount Vernon Memorial Highway. During construction when it was still possible to use the construction staging one could step outside the structure and admire the beauty of the facing, but now only fishermen and—we were going to say bootleggers, but they are of the past—can see this artistic handicraft, and possibly have the time or inclination to admire it. The grade-separation structure where two highways are concerned offers the best chance for artistic treatment where the public can see and give credit for the efforts of the engineers and architects. Concrete, stone and brick structures offer many opportunities for interesting artistic treatment with local history, tradition and industry woven into the theme of the decorative treatment.

A New Hampshire water-struck brick was used for the veneer on the Lynnfield structure with every sixth course of brick tied to the concrete masonry by a special wall tie with a dovetail end fitting into a metal slot cast in the concrete when poured.

The depressed area is drained by a 36-inch reinforced concrete pipe carried one-half mile to a stream. The quantities and unit prices for the structure

(*Continued on page 31*)

CULVERT CARRIES HIGHWAY THROUGH CITY

C. & E. M. Photo

Looking South on Fifth Avenue, McKeesport, Pa., Toward a Completed Section of the New Storm Sewer. See Page 15.

Settled Pavements Raised by Mud-Pump

Methods and Cost Data on Missouri's Practice for Correcting Settlement of Concrete Pavements

By E. L. ESPENETT, Assistant Division Maintenance Engineer, and LEON CORDER, Permit Inspector, Missouri State Highway Department

(*Photos on page 36*)

✦ DURING the early stage in the construction of Missouri's system of concrete highways, a considerable mileage of pavement was laid on new fills which had not been jetted or compacted in any way except by a roller while the fill was being made. A large number of settlements in the concrete pavement has resulted, constituting one of the earliest maintenance problems encountered in this type of pavement.

These settlements were first taken care of by building up an asphalt mat. This, however, developed into an expensive procedure as well as proving unsightly due to the black patches on the light-colored concrete. During the winter of 1930-31, experiments were made with the use of a Mud-Jack for raising these settlements. In the spring of 1931 several of these Mud-Jacks were purchased and later still others were added until at the present time there are nine of these machines in use during the summer months throughout the state.

Procedure

The first procedure is to drill 2½-inch holes through the pavement. This was accomplished formerly by the use of air-compressor-operated jackhammers, using large removable bits. The best results seem to be accomplished by drilling the holes 6 feet apart in three rows. One row is drilled a few inches each side of the center joint, just far enough from the joint to clear the parting strip. The other rows are drilled just inside the thickened edge of the slab, which is 2 feet from the edge in most of the pavements so treated. The holes in each row are staggered.

Investigations of the under-side of the pavement disclosed that this method of drilling the holes caused considerable spalling of the concrete around the hole on the bottom of the slab, and in 1934 this method was abandoned and core drills substituted.

The core drills are operated in pairs. Two core drills can usually drill enough holes for one Mud-Jack crew, and two drills of the type used are readily hauled side by side in a stake body truck. They are readily loaded and unloaded by means of a removable ramp and two small hand-operated winches mounted just behind the cab of the truck. Enough room is also available in the front of the truck bed for a 300-gallon tank of water, which is more than ample for one day's drilling.

The core drills are self-propelled with a simple lever for steering, which makes them easy to move from one hole and spot accurately at the next location. A 30-gallon water tank is mounted in the rear, just above the drilling head. Constant pressure is maintained by the operator with a hand wheel, in the same manner as a drill press. Water is fed to the drill through a hollow head in which the bit is fastened.

The actual drilling is done with a bit, which is a mild-steel tube 2½ inches in outside diameter, with ½-inch walls. A notch is cut with a hack saw and has to be recut as the drill wears away. The drilling is accomplished with No. 13 chilled-steel shot which is held in the slot as it rotates. This is cooled and lubricated by a constant stream of water.

One of the Mud-Jacks Used by the Missouri State Highway Department

The Mud-Jack

The Mud-Jack consists of a power unit, mounted on a chassis, which operates a mixer mounted on the rear of the unit; double-acting pistons which force the mud through a hose through the holes in the pavement; and a small water pump for furnishing water to the mixer.

Sand is an undesirable material to use because of its abrasive action on the machinery, and clay is not suitable because of its swelling and shrinking qualities as well as the difficulty encountered in mixing it with water. The ideal material seems to be a medium loam which is usually easily obtained on the right-of-way. A small amount of roots and sod clumps does not seem to be harmful, especially when the new self-cleaning check valve is used.

Approximately one 96-pound bag of cement is used per cubic yard of dirt. This cement serves the double purpose of absorbing any excess water and hastening the drying out of the mixture. The cement is first spread on top of the dirt, then both are dumped into a trailer immediately behind the Mud-Jack, in a convenient position for feeding by hand into the mixer. An ordinary stock tank mounted on the trailer is used to supply the water to the pump on the Mud-Jack. The dirt and cement are fed by hand into the mixer hopper, where mixing with the water is accomplished by a set of knives mounted on a horizontal shaft. The water supply is controlled by the man who feeds the mixer.

After being mixed to the proper consistency, the mud is pumped through a 3-inch hose and the nozzle apparatus into the holes previously drilled in the pavement. A handle is convenient for guiding the nozzle into the hole and also for dragging the hose from hole to hole. A round saucer-shaped device is used by the hose man to stand on to keep the nozzle from being forced out of the hole. It also keeps him from being sprayed with mud in case of minor mishaps. Any mud spilled on the pavement is immediately shoveled onto the shoulder, and not back into the machine as any stray core drill shot would immediately raise havoc with the pumping cylinder.

Equipment Used

The equipment used includes one Mud-Jack with the trailer platform for handling the dirt and water-supply tank, a water truck for transporting water to the unit, a dump truck to haul dirt and to

(*Continued on page 11*)

Spillway Concreting For Imperial Dam

Progress and Methods of Excavation and Concreting Of Main Overflow Section By Morrison-Utah-Winston

By JOSEPH C. COYLE

(*Photo on page 36*)

✦ CONCRETE work at Imperial Diversion Dam on the Colorado River near Yuma, Arizona, was resumed September 1, 1937, after suspension during hot weather. Excellent progress is being made on the main overflow section of the dam by the Morrison-Utah-Winston Construction Co., the general contractor. As much as 522 cubic yards of concrete has been placed by one of the three 8-hour shifts, using 2½-yard draglines to handle 2-cubic yard pour buckets, filled by truck mixers hauling concrete from the two mixing plants used at the dam.

Spillway Details

The overflow or spillway section is a hollow weir of reinforced concrete, approximately 1,200 feet long and 31 feet high at the axis. It rests on a layer of compacted earth placed on the natural sand of the river channel. It is strengthened by sixty-one buttresses varying from 3 feet 5 inches to 2 feet 6 inches thick. The bottom slab of the hollow portion is 22 inches thick between the buttress haunches. The toe of the weir is 8 feet thick where it joins the downstream apron. Under the toe is an inverted drain 6 feet deep with 1½ to 1 side slopes. This is filled with layers of sand and gravel, starting with sand and each succeeding layer being coarser. Six-inch drain pipe, placed upright, leads from the center of this drain into the hollow of the weir. Seepage water rising through the drain pipe is expelled by sixty-four automatic ejectors. There will be a warped wall at each end of the downstream apron connecting with a rock-filled training dike, the westerly end of which will carry a 16-foot roadway.

The weir is 82 feet 7 inches wide and the downstream apron is 66 feet 3⅞ inches wide and 8 feet thick. The upstream side has a 4 to 1 slope for 25 feet 3⅞ inches, with steps 2 feet 4 inches high at the lower edge. The remainder of the apron is level, with 3-foot 9-inch steps at the downstream side, where a line of 32-foot steel sheet piling, driven across the channel, extends 18 inches into the bottom of the slab. The channel for 150 feet downstream is riprapped with rock to a minimum thickness of 3 feet and a maximum of 10 feet for the downstream end, 60 feet of which is on a 5 to 1 slope. Upstream there is a reinforced concrete paving slab 160 feet wide, with a cut-off wall of 40-foot steel sheet piling under the downstream edge, a wall of 24-foot wood sheet piling at the middle and a similar wall under the upstream edge. The concrete in the apron slab is thickened to 18 inches over the pile lines and a tight joint is obtained by a mastic filler. The hot mastic is poured into metal inverted forms which are left in place when the concrete is poured. The mastic is heated in a tank 8 feet long x 4 feet wide and 4 feet high, including an 18-inch firebox lined with firebrick. It is mounted on springs and chassis with four solid-tired wheels and has an extensible tongue of 6-inch pipe with a metal support beneath the front end of the frame. There is a 6-inch pipe and valve at one side for drawing out the hot mastic.

The river flow has been diverted through the last two-gate structures at the Arizona abutment, after a channel and training dikes had been constructed with Northwest draglines above and be-

(*Continued on page 16*)

Levee Break Repaired With Hydraulic Fill

Work at Wolf Island and Pritchard Landing on Mississippi Rushed to Completion by U. S. Engineer Dept. After 1937 Flood

✦ ABOUT noon on Jan. 25, 1937, the floodwaters of the Mississippi River made a natural crevasse and resulting "blue hole" in the front-line or river-front levee of the Birds Point-New Madrid Floodway opposite Wolf Island, Mo., approximately 25 miles by river below Cairo, Ill. The crevassed section of levee was about 1,000 feet in length with a maximum depth in the "blue hole" of 62 feet below the natural ground surface. A "blue hole," as referred to herein, is the eroded area created by the scouring action of water flowing with high velocities through the crevasse or opening through the levee.

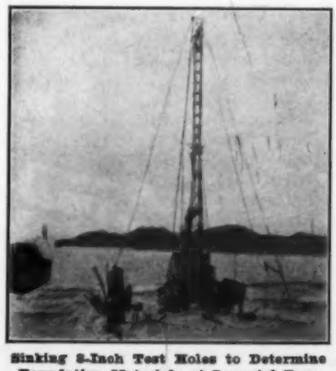
Restoration of the levee along its original alignment to a larger than original cross-section and partial filling of the "blue hole" was accomplished by the United States Engineer Department, utilizing both floating hydraulic and land mechanical equipment. The cross-section of the completed levee has a crown width of 12 feet at Elev. 320.2 (Mean Gulf Level) with a 1 on 5 slope to Elev. 306.2 on both landward and riverward slopes. False berms were constructed contiguous to the levee section, that on the land side having a crown width of 200 feet and slope of 1 on 200, and that on the river side having a crown width of 120 feet and slope of 1 on 120. From the outer crown shoulders of both false berms the fill was placed on slopes of 1 on 10 to Elev. 290.0, then on slopes of 1 on 4 to the bottom of the "blue hole". A total of 1,071,834 gross cubic yards of material was dredged in completing a net section of 992,439 cubic yards. The maximum height of new fill was 57 feet, with an average of 46 feet.

The United States Engineer Department Dredges Omega and Ockerson were used to dredge and place the material within the completed levee and fill section. Wolf Island Chute was used as a borrow pit for both dredges, the material being approximately 75 per cen' clay and 25 per cent sand.

The Dredge Ockerson, with a 34-inch suction and 32-inch discharge, pumping through a maximum of 1,800 feet and an average of 1,400 feet of floating pipe line and against a lift of 3 feet, was used in making the initial fill or base, pumping the material to the water surface or approximate Elev. 290.0. This elevation varied with fluctuations of river stages.

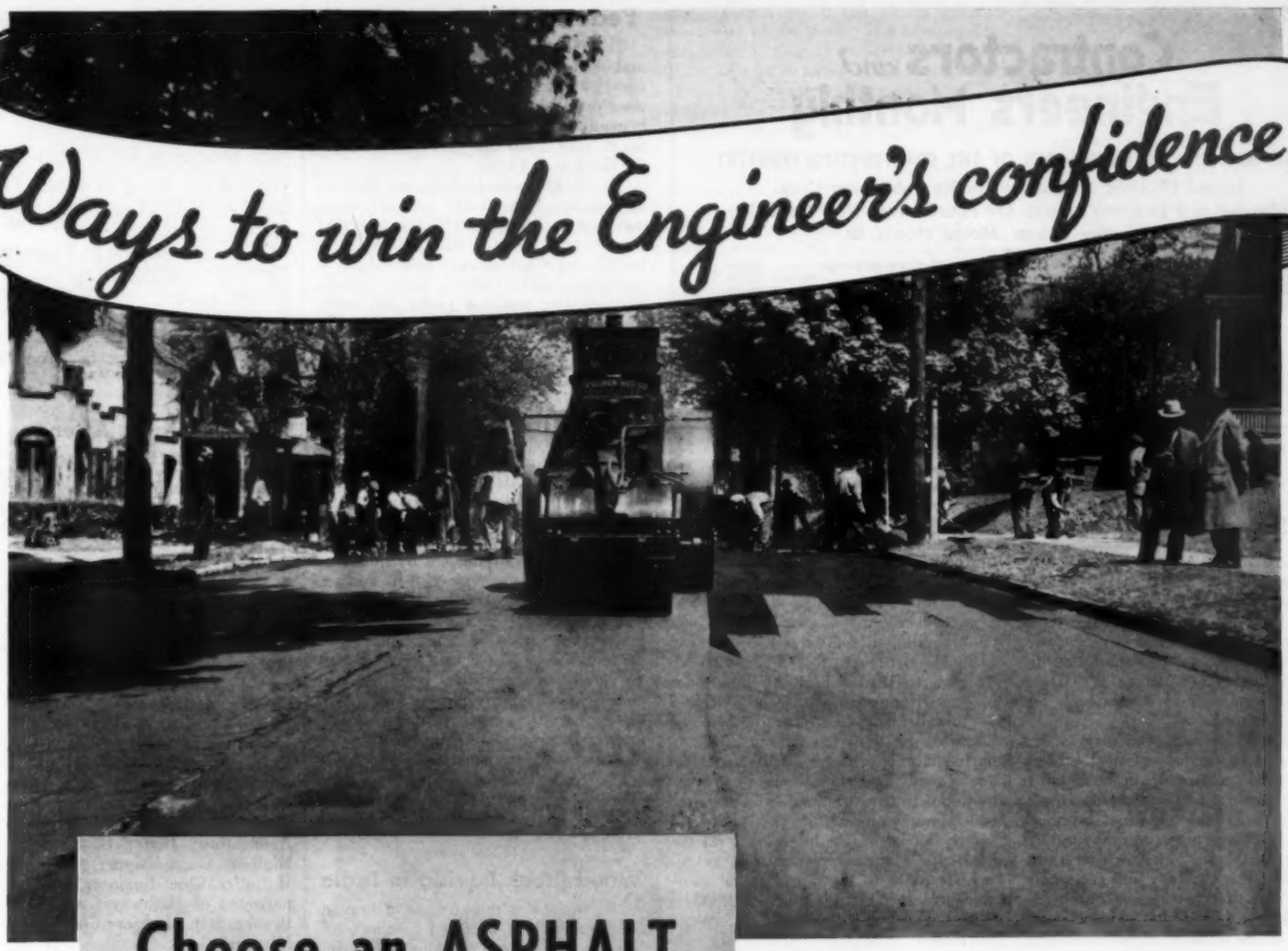
The Dredge Omega, with a 21-inch cutterhead suction and 18-inch discharge, pumping through 800 feet of floating pipe line and varying lengths of shore pipe line of 600 to 1,800 feet and with lifts of 10.5 to 36 feet, was used to complete the fill.

(*Continued on page 23*)



Sinking 8-Inch Test Holes to Determine Foundation Materials at Imperial Dam

Ways to win the Engineer's confidence



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Esthetics Is Economy

A Sermonette on the 1937 A. I. S. C. Bridge Awards

On June 23 the American Institute of Steel Construction announced its awards for the most beautiful steel bridges completed during 1937. This is the tenth year that these awards have been made, with the sole purpose of stimulating the design of bridge structures which are not only efficient and economical, but beautiful as well.

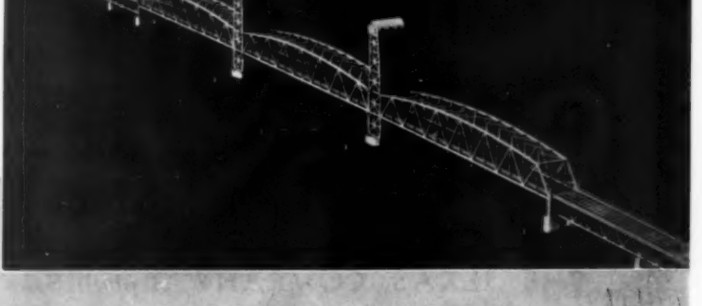
These ten awards to the owners, designers and fabricators of steel bridges have served as stimuli to economical esthetics and not to extravagant ornateness. F. H. Frankland, Chief Engineer of the Institute, after announcing the decisions of the Jury of Award at a dinner tendered to the Jury and recipients, pointed out that ugliness is not necessarily economy and that, while beauty is more or less a matter of personal opinion, concensus of public opinion usually approves the attractive rather than the ugly, in spite of the service the structure may render. In the case of one bridge, the estimated cost of which was $177,800, a slight change in the design made what would have been a distinctly drab structure an attractive feature of the landscape at a cost of $360, based on alternate bids on the two designs.

The awards this year include three classes of fixed-span steel bridges: Class A, structures costing more than $1,000,000; Class B, those costing between $250,000 and $1,000,000; Class C, bridges built for less than $250,000; and a new class, movable-span bridges of all types. The Class A award went to the Golden Gate Bridge, in the design of the towers for which the diagonal braces were eliminated in a definite attempt to increase their beauty. The Class B award was given to the Little Hell Gate Low-Level Bridge between Randall's Island and Ward's Island, New York City. This structure is trapped between the Triborough and Hell Gate Bridges so that its beauty is lost to the passerby. It is interesting to note that the idea of beauty was not given any special consideration in the design, although the architect, Aymar Embury II, did make some suggestions for alterations in the length of the three spans, which measure 167, 280 and 242 feet, to improve the lines of the structure. Economy in construction, however, was the main thought behind the design. The Class C award went to the Chesterfield-Brattleboro Bridge built by the States of New Hampshire and Vermont and designed by Harold E. Langley, Bridge Engineer of the New Hampshire Department of Highways. This structure, one of many to replace those swept away by floods in New England, was designed for economy and ability to withstand future floods and in harmony with the landscape at the river crossing.

First place in the new class of movable-span bridges was given to the Marine Parkway Bridge over Rockaway Inlet, New York City. On this structure definite thought was given to making the towers of the lift span attractive and indicative of their function. The tops end in scrolls housing the sheaves of the lifting cables and thus accentuate the service of the towers in an esthetic manner. In addition, the scrolls point toward the lift span itself and center attention on the movable portion of the structure.

It is not difficult for any construction man to recall the steel atrocities of 25 years ago. Many are still in existence, serviceable and ugly and growing more grotesque each year in comparison with the increasing number of bridges designed to harmonize with the surrounding terrain, increasing rather than detracting from the traveler's enjoyment of the landscape as a whole.

Examination of the brochure issued by the American Institute of Steel Construction to commemorate the tenth year of awards shows that even among the most beautiful steel bridges of the past ten years there has been a noticeable improvement in esthetic qualities. The A. I. S. C. has contributed much to the pleasure of mankind in its steel structures by stimulating architect and engineer alike to designing spans basically economical and serviceable and also attractive to the public eye.



The 1937 Prize-Winning Bridges. Lower Left, The Golden Gate Bridge. Lower Right, Little Hell Gate Low-Level Bridge Between Randall's and Ward's Islands, New York City. Below, The Marine Parkway Bridge over Rockaway Inlet, New York City. Right, The Chesterfield-Brattleboro Bridge Between New Hampshire and Vermont.

Federal Aid for 1940-41

The Hayden-Cartwright Act of 1938, authorizing Federal Aid for highways for 1940 and 1941, has been signed by the President. This act provides for the expenditure of $158,500,000 during the fiscal year 1940 and $191,000,000 for the fiscal year 1941.

The 1940 authorizations are divided as follows: Federal-Aid primary highway system, $100,000,000; secondary or farm-to-market roads, $15,000,000; protection and elimination of railroad grade crossings, $20,000,000; forest roads, $10,000,000; national parks and parkways, $10,000,000; Indian roads, $2,500,000; and public land roads, $1,000,000. Expenditures for 1941 will include $115,000,000 for the primary system, $15,000,000 for secondary roads, $30,000,000 for grade crossings, $13,000,000 for forest roads, $13,000,000 for national parks and parkways, $3,000,000 for Indian roads and $2,000,000 for public land roads. In addition to these amounts, an emergency fund of $8,000,000 for the repair and reconstruction of highways damaged by floods or other disasters is provided for by this act.

In commenting on the Hayden-Cartwright measure, Charles M. Upham, Engineer-Director of the American Road Builders' Association, said, "This assurance that Federal Aid for highways will be continued for two more years is particularly gratifying to all of us who are interested in the national welfare. It makes possible the construction of much-needed safe highways in all of the forty-eight states which will considerably reduce the number of deaths in highway accidents."

Wood Block Paving in India

Due to the wealth of timber in Travancore, India, it is reported by the U. S. Bureau of Foreign and Domestic Commerce that the Government, on the advice of the new Timber Expert and Director of Development, has decided to use wood for roads. As an experimental measure, a mile of road in Trivandrum and a mile of road in Nagercoil town are to be surfaced with pressure-treated wood blocks. The Public Works Department will carry out the scheme in consultation with the Director of Development.

"Mike's Got Some Mighty Funny Ideas About Blasting!"

U. S. Delegates Attend Congress at The Hague

At the invitation of the Netherlands Government, the Eighth International Roads Congress was held at The Hague from June 18 to July 2.

Official delegates from the United States included Thomas H. MacDonald, Chief, and R. E. Toms, Chief of the Division of Design, U. S. Bureau of Public Roads; Jesse F. Van Wickel, Commercial Attaché, The Hague; Murray D. Van Wagoner, President, and Charles M. Upham, Engineer-Director, American Road Builders' Association; J. S. Helm, President, The Asphalt Institute; Thomas P. Henry, President, American Automobile Association; F. C. Horner, Acting Chairman, Highways Committee, Automobile Manufacturers Association; Henry G. Shirley, State Highway Commissioner of Virginia; T. H. Cutler, Chief Engineer, Kentucky Department of Highways; and Robert B. Brooks, State Highway Commissioner of Missouri.

State and county highway engineers! Watch for "Summer Time Is Repair Time" in our August issue. It has some timely information for you.

Standard Road Mix For Arkansas Road

Dense-Graded Aggregate and MC-3 Asphalt Used on 6-Inch Primed Base by A. C. Kennedy

✦ IN the preceding articles in this series we have shown the experimental work with road mix that was done in the 1937 season in Arkansas, using different asphalts in an endeavor to determine the best for the type of aggregates available. This article describes a typical contract operated with the asphalt that had been found most acceptable up to the work undertaken this season, and using blade mixing.

The work, located north and south of Marianna, Ark., was done as a WPMH project, under several project numbers, totaling a length of work of 6.7 miles. Work was started March 30, 1936, on grading, pipe culverts and building up the shoulders. The work was not rapid but the methods are of importance in the study of road-mix construction. There was delay in getting the base material because it was necessary to haul over another contract and that contractor was fearful lest the heavy loads might destroy his work in the intermediate stage.

Straight pit-run gravel with not more than 10 per cent retained on a 1½-inch screen was hauled in for the base beginning June 29, 1936, but drought conditions set in, preventing the working and setting up of the gravel. It is absolutely necessary to have moisture present to insure the compaction of the gravel and binder under traffic. The base was 6 inches thick when completed under traffic with no rolling. The base was primed in the autumn in the hope that some of the work could be finished before it was necessary to shut down because of the winter rains. Work was discontinued for the season on December 18, 1936, and the prime was practically destroyed during the winter.

After reshaping the base in the spring, it was reprimed with ¼-gallon per square yard of MC-1 asphalt and reshot where the gravel was loose or too open in texture. This work was done with a Littleford distributor having a 10-foot spray bar. The spot priming for loose gravel was done with a hand-spray attachment by a man walking behind the distributor, moving slowly and hitting the places which needed the extra shot. The prime was cured for three days under traffic with very little pick-up of the material.

Placing Road-Mix Aggregate

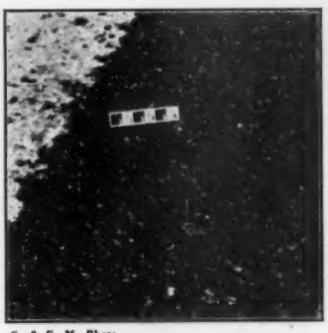
The primed base was hand-cleaned by brooming before the pit-run aggregate was laid down. This material had all the stone over 1¼ inches in diameter screened out. Although washing was not specified, the commercial plant furnishing the aggregate was washing the pit-run material for concrete aggregate at the time and found it more economical to replace the 200-mesh material which had been removed by washing. The washed aggregate was picked up with a clamshell bucket and mixed with the proper amount of 200-mesh material, the mixing being done entirely with the clamshell. The final analysis of the aggregate was:

Retained on ¾-mesh screen	0 per cent
Retained on No. 4 screen	43 per cent
Retained on No. 10 screen	57 per cent
Passing 200-mesh screen	7 per cent

The aggregate was hauled from the commercial plant by trucks and put down by home-made spreader boxes at the rate of 190 pounds per square yard which gave a 1¾-inch compacted thickness. At first the stone was spread with two boxes for the full width and then the practice was changed to the use of one box down the center and the material spread double thickness. The boxes were 9 feet wide. The base material had been spread 20 feet wide and primed for the full width and the material for the road-mix surface was 18 feet wide.

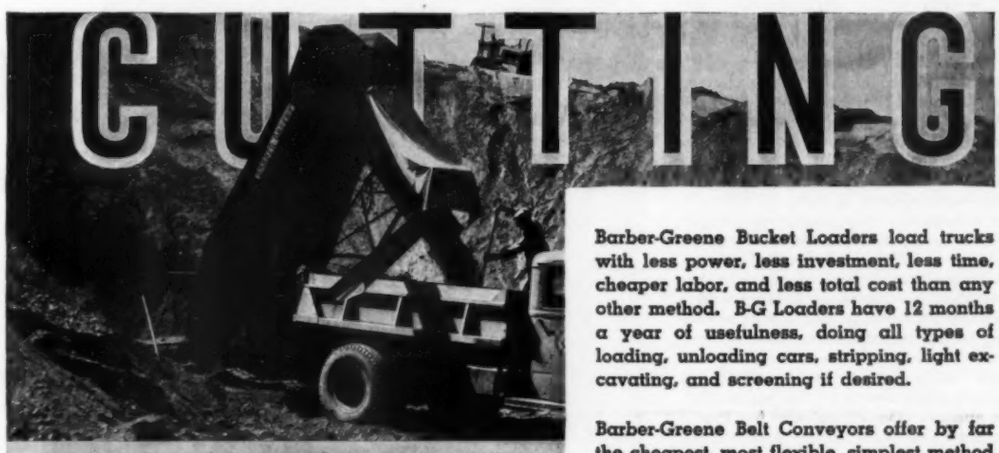
As soon as the road-mix aggregate had been spread it was worked across the road by two Allis-Chalmers Speed Patrols with 12-foot blades to dry the material to less than 2 per cent moisture. After drying, the material was bladed to a uniform 18-foot layer and then one half was bladed to one side in a windrow and shot with 0.32 gallon of MC-3 per square yard of completed surface. This was repeated until four applications had been made with blading of the entire windrow after each shot by slicing off about one quarter of the windrow and carrying it just to the left of the center of the road. The total application was 1.28 gallons per square yard at 60 degrees F. which is the equivalent of 1.32 gallons per square yard at 170 degrees F. as shot in the field, with extractions showing 4.45 per cent asphalt cement by weight.

After the fourth part of the windrow had been sliced and moved over for the fourth time, the entire windrow was moved by the blades to the right-hand quarter point of the road and the process repeated with the material that had been spread to dry on the other half of the road. Upon completion of the mixing of the second windrow, the two were pulled together at the center of the road. Then the blading for curing began by cutting one-third to one-quarter of the windrow per trip and moving it to the left quarter point. This blading back and forth was continued until curing was complete. The maximum time required was 14 days and the least 4 days. Temperature, surface exposed and the moisture in the air are the factors that determine the rate of curing. Throughout the blading, traffic used the road, dodging in and out between the patrols. The mixing of the material was completed long before the curing and is really not the important item in the processing.



C. & E. M. Photo
The Surface Texture at the Edge of the Completed Pavement

(*Continued on page* 21)



The Primary Purpose of All Barber-Greenes

Barber-Greene Bucket Loaders load trucks with less power, less investment, less time, cheaper labor, and less total cost than any other method. B-G Loaders have 12 months a year of usefulness, doing all types of loading, unloading cars, stripping, light excavating, and screening if desired.

Barber-Greene Belt Conveyors offer by far the cheapest, most flexible, simplest method of unloading, stocking, moving bulk materials. Their standardized sectional construction gives unequaled original delivery, erection and change of set-up.

It is these facts that make Barber-Greene pre-eminent in Cost Cutting Material Handling. For full information, phone, wire or write Barber-Greene Company, 485 West Park Avenue, Aurora, Illinois.

36-8

STANDARDIZED MATERIAL HANDLING MACHINES

Representatives in Principal Cities

BARBER GREENE

BRANCH OFFICES
Cleveland · Chicago · New York
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Standardized Belt Conveyors
CARRIERS
Portable CONVEYORS
Permanent CONVEYORS
and other standardized unit parts
SNOW LOADERS for high speed removal
MIXERS for Bituminous or Stabilized Mixing Central or Travel Plant
Leveling-Tamping FINISHERS
LOADERS for lowest cost loading
Vertical Boom DITCHERS
Low Cost-High Quality Road Construction

The New Lincoln 300-Ampere Diesel-Engine-Driven Arc Welder in Use on a Pipe-Line Job

New Arc Welders Now Diesel-Engine-Driven

A new diesel engine, comparing favorably with gasoline engines in simplicity, weight and operating speed and bringing the economy of diesel operation to all applications of welding, has been adopted for driving Lincoln arc welding generators by the Lincoln Electric Co., Cleveland, Ohio.

This new diesel-driven welder, which has been tested in the field, is claimed to cut fuel costs from 33 to 86 per cent. At full load operation, it uses only 1.5 gallons of fuel oil an hour as compared with 2.75 gallons of gasoline an hour required by the conventional gasoline-engine-driven welder.

A feature of the engine is the patented combustion chambers. By accelerating turbulence of the fuel and air mixture, this device affords complete combustion, increased efficiency and a minimum of smoke and noise, according to the manufacturer. Also the position of this combustion chamber, relative to the piston, provides uniformly distributed pressure on the piston. Other engine features include pintle-type fuel nozzles which are non-clogging and non-enlarging; three fuel oil filters, one oil-type air filter and one lubricating oil filter; and use of the required number of standard 6-volt automobile batteries for starting to facilitate field service and replacement. Through a standard relay the exciter charges the batteries. The main welding generator is used to start the engine.

The arc welding generator used on this new diesel-driven outfit is the 300-ampere Shield-Arc SAE unit with dual-continuous control, a method of welding-current control which provides the right size and type of arc for every application of electric welding.

Blaw-Knox Takes Over Highway Equipment

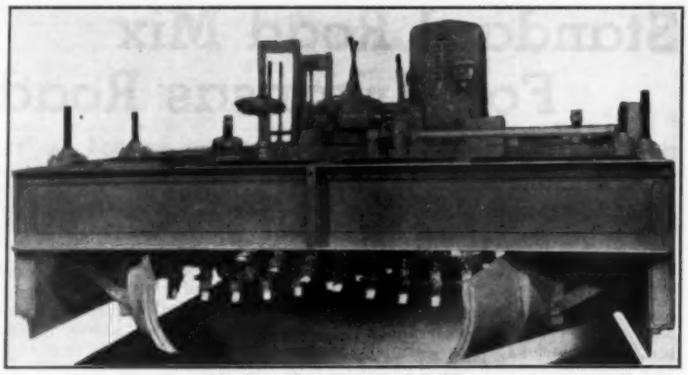
Two pieces of road-building equipment, formerly made by the Flynn Mfg. Co. of Alexandria, La., have been taken over by the Blaw-Knox Division, Blawnox, Penna., and will henceforth be known as the Blaw-Knox Road Builder and the Blaw-Knox (Flynn) Surgrader.

The Road Builder is an entirely new machine which may be used for subgrading for concrete pavement or for road-widening work, for building shoulders and for stabilizing secondary roads. In one operation the Road Builder pulverizes and mixes materials for all types of granular stabilization and for the lighter types of oil-mix work. The machine travels on the subgrade without the use of forms, and form trenches are graded at the same time as the road bed. Transverse conveyors dispose of the excavated material outside the limits of the subgraded area. Accessories for the machine include windrowing blades, a proportioning pump for mixing water or emulsified asphalt with the material being pulverized, a tank for these mixers, and a screed with plow and blades which may be used for smoothing the stabilized base true to crown and proper width.

The machine, which is also adaptable for reshaping and smoothing certain types of existing asphaltic or asphalt-macadam roads, is self-propelled and is mounted on crawler-type tracks. The digging and pulverizing teeth are mounted on a revolving cylinder and are adjustable for crown and cut to a maximum depth of 10 inches. Only a final blading and rolling are required after passage of the Road Builder, according to the manufacturer.

The Blaw-Knox Surgrader, which travels on road forms, is exclusively for subgrading for concrete pavement or other types of road work where forms are used and is adjustable for road widths up to 22 feet. The machine travels under its own power on crawler treads and wheels and is so designed that its load is spread over a sufficient length of form to protect the form from damage and to prevent settlement. The unit is equipped with conveyors for removing materials from the subgrade and carrying them in windrows alongside the road. Another feature of the Surgrader is a truck overpass which is entirely automatic and which allows batch trucks to drive over the machine without interrupting operations. A moving truck is also furnished for transporting the machine.

More than sixty Surgraders are now in operation throughout the country on all types of road construction.



The New Blaw-Knox Road Builder

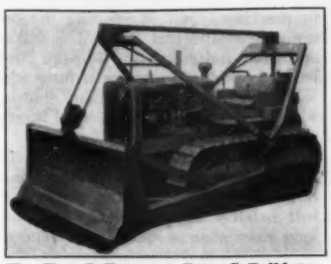
Good
Development of Link-Belt Speed-o-Matic control puts manual lever-operated shovels back in the class with automobiles you had to crank by hand . . . . . Today you push a starter button in your car, drive farther and feel fresher at the end of the day. With the Speed-o-Matic control and its twist-of-the-wrist levers, you make more dirt "go places" all day without fatigue.
OBSOLETES THIS
EASY AS DRIVING A CAR
LINK-BELT

New Type of Bulldozers

Incorporating the most practical structural features of all previous models, a new type of Angledozer and bulldozer, to be known as Type C, has been added to the line of heavy grading equipment manufactured by R. G. Le Tourneau, Inc., Peoria, Ill., and Stockton, Calif.

Both the Angledozer and bulldozer, which are designed for use on Caterpillar D4, D6 and D7 tractors, utilize a bowl and yoke structure similar to that of the previous models but the bowl is supported by an overhead A-frame rather than by two side arms. Due to its central mounting, this overhead frame distributes the weight of the 'Dozer more uniformly over the tractor tracks. The cable life has also been lengthened by the use of fewer sheaves in a more simple arrangement.

The Angledozer embodies the quick-changing angling and bowl-tilting adjustments of former models, permitting sidecasting up to 30 degrees to the right



The New LeTourneau Type C Bulldozer Mounted on an RD Tractor

or left and lowering either corner of the blade for ditching or sidehill cuts.

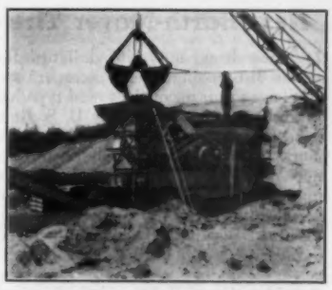
Both machines retain the speed, accuracy and power of operation of former models through a single cable from a power control unit mounted on the rear of any tractor or on the front of the D6 and D7. Special Angledozers and bulldozers, not of Type C, for the Caterpillar D8 are similarly controlled by either a front or rear power control unit.

Dams and Control Works

A revised edition of "Dams and Control Works," first published in 1929, has recently been brought out by the U. S. Bureau of Reclamation, Department of the Interior. This second edition contains much new material, bringing up to date information on the progress of dam construction and presenting for the first time in handy form the results of the studies made in the Bureau's various laboratories.

The volume includes chapters on the design and construction of such outstanding structures as Boulder, Grand Coulee and Imperial Dams and special articles on high-pressure reservoir outlets, testings of dams, concrete laboratory operations, earth materials laboratory operation, design and construction of small earth dams and similar subjects.

Copies of this book may be secured from the Bureau of Reclamation, Department of the Interior, Washington, D. C. Price: $1.00.



The New Cedar Rapids Stabilizer Plant

New Stabilizer Plant

A new stabilizer plant for mixing clay soils, aggregates, calcium chloride, salt, and similar agents has been announced by the Iowa Mfg. Co., Cedar Rapids, Iowa. Some of the features of this Cedar Rapids plant are positive non-clogging clay-soil feeder, accurate proportioning devices, low operating height, portability and large capacity.

The plant consists of one main truck unit, pneumatic-tired, on which is mounted the various processing units. Because the plant set-up is generally made at stockpiles, the stabilizer plant is designed for clamshell feeding with large receiving hoppers above both the aggregate and clay-soil feeders. The aggregate is fed through the aggregate feeder in predetermined quantities direct to the pugmill. The clay-soil is fed by mechanical screws to the short belt conveyor leading to the distintegrating crusher where the clay-soil is processed to specifications and then discharged to the pugmill. A separate calcium chloride or salt feeder is used to introduce these items and is so designed that the feed is in constant proportion to the balance of the materials according to specifications. The mixing is done in a long single shaft pugmill which can be raised or lowered from the horizontal operating plane as required to secure the best mix. The finished mix is discharged onto a delivery conveyor which can be designed for direct truck loading or for delivery to a storage loading hopper or bin.

The entire plant is operated from one power unit which can be either gas or diesel, at the option of the user.

Oil-Burning Kettles For Heating Asphalt

The features of the Type MN oil-burning kettle for heating asphalt, tar, pitch, road oil and similar materials, made by The Macleod Co., 2232 Bogen St., Cincinnati, Ohio, include the return system of heat, with a separate compartment for the melted material.

This unit includes a removable inner melting tank of 10-gage fire box steel having a splash flange, an outer casing of 12-gage plate, mounted on a trailer chassis with semi-elliptic springs, and a Macleod portable oil burner, a 20-gallon oil tank, air pump and fittings. Type MN is available in capacities of 50, 75, 110, 160 and 210 gallons, with steel wheels, solid rubber tires or pneumatic tires.

Further details on these kettles as well as on the other types of heating kettles, bituminous distributors, surface heaters and tool heaters made by The Macleod Co. are contained in Bulletin No. 309-B, copies of which may be secured direct from that company by mentioning this magazine.

New District Sales Mgr.

The Murphy Diesel Co., Ltd., of Milwaukee, Wis., has announced the appointment of W. C. Morgan as District Sales Manager in the Southwest territory. The W. K. M. Co., Tulsa, Okla., is distributor for Murphy diesels in the mid-continent territory.

Doubters HELPED US PROVE OUR CLAIMS FOR SPEED-O-MATIC

● You may have had your doubts about Link-Belt Speed-o-Matic control when it was first introduced. Good doubters were just what we needed to prove performance claims. Now let's take a look at the records. Here is what four different users report:

640 Truck Loads — 2 Dippers Each — in 8 Hours

"I wouldn't only say that K-480 is an outstanding shovel. Since receiving reports on it as a dragline, I will say that it is more than outstanding as such.

"As a shovel, we loaded 640 Ford trucks with two dippers to every truck, in 8 working hours. As a dragline, we are actually doing 1245 passes with a one-quarter swing, with a 2½-yd. Esco bucket and 52-ft. boom, casting the material, in 8 working hours."—R. W. Helmle, M.M., Utah Const. Co.

Average 1808 Yds. in 8 Hours

A. J. Leaf Co., Utica, N. Y. K-45 Speed-o-Matic Shovel, 1½-yd. bucket. 94,000 yds. of fill material moved in 52 working days of 8-hours each, an average of 1808 yds. per day. On the maximum day, a total of 2638 yds. were handled. Unusually severe work. Material consists of a thick, hard, red shale rock base, cemented gravel and thin loam top. Material comes out hard, but when dumped into the truck, breaks into fine dust which blows into the machinery. Yet, when the shovel bites into the bank, the tooth marks remain as if cut in stone.

3173 Yds. in 14 Hours

Parlor City Construction Company, Endicott, N. Y. K-45 Speed-o-Matic Crane at concrete mixing station. Emery Potter, Operator, says—*"I went right to work on it without previous experience on a hydraulic machine.* It is easier to operate than the best of the lever machines. After a 14-hour day I was not tired, but after a 10-hour day on a lever machine I'd be worn out. A 14-hour, 3173 yard day was an easy job. I didn't rush a bit. All in all the management considers the Speed-o-Matic crane very satisfactory and the best on the market."

Speed-o-Matic Dragline Effects Annual Saving of $6929.00

Capparell Stripping & Construction Co., Humboldt, Penna. By direct comparison with costs on mechanical lever-operated draglines on stripping overburden and loading anthracite, Link-Belt Speed-o-Matic machine makes this saving by increasing yardage up to 50%. "With the Speed-o-Matic I could go two shifts as easy as one," says Paul Lindsay, operator of this machine. *"There's a lot of difference between flipping a small lever with one finger and pulling a long lever."*

It will pay you to investigate the profit possibilities of Speed-o-Matic Shovels - Draglines - Cranes. Send for Book No. 1795.

LINK-BELT COMPANY 7438

300 W. Pershing Road, Chicago Distributors and Offices in Principal Cities

Speed-o-Matic SHOVEL DRAGLINE - CRANE

New Earth-Mover Tire

A new heavy-duty tire designed for use on dirt-moving buggies, scrapers and similar equipment of the towed type has recently been announced by U. S. Rubber Products, Inc., 1790 Broadway, New York City. The tread pattern of this new Royal Earth Mover tire offers minimum rolling resistance and control of side slips under the most adverse conditions, according to the manufacturer.

Eleven rows of blocks, instead of the conventional five rows, extend well up the sidewalls of the tire, bringing into play when the going is extremely soft more than twice the gripping area of the conventional tire tread. Extra protection against sidewall scuffing is provided by the smooth guard ribs flanking the non-skid area. For convenience, each tire carries on its sidewall a seal giving load and inflation recommendations for all types of jobs.

Truck Mixers and Agitators

A new descriptive catalog on Rex Moto-Mixers and agitators, entitled "Payloads for '38" has recently been issued by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis. In addition to describing and illustrating the outstanding features of these Moto-Mixers and Moto-Agitators, this 44-page booklet also contains a number of interesting job photographs and a map showing where Rex Moto-Mixer fleets are located throughout the country.

Among the features described is the Rex cone-end drum which is designed large enough in diameter to facilitate full batch loading, with a sufficiently long steep cone to assure end-to-end action for fast and thorough mixing.

Copies of this catalog No. 33 may be secured by interested readers direct from the manufacturer.

Folder on Long-Life V-Belts

Another of the series of bulletins on the various uses of Gates Vulco belts has just been issued by the Gates Rubber Co., Denver, Colo. This folder features the use of these belts on dredge conveyors as well as describing various other uses. Included with the folder was the material to make an interesting test to demonstrate the construction features of Gates Vulco rope.

Copies of this folder may be secured by interested readers direct from the manufacturer by mentioning this magazine.

SOLID ROCK MOVED DIRT CHEAP

We'll never again tell an experienced LeTourneau user that a job is too tough to handle with Scrapers. Good as we knew LeTourneau equipment to be—from design, right down through the final assembly—Fred Kutzke's amazing story caught us (along with most contractors) with our mouths wide open. Most of his job is solid rock!

While other contractors bidding the Blue Mounds (Wisconsin) highway job on U. S. Route 18 figured on a basis of trucks, shovels and plenty of dynamite, Fred Kutzke & Co. said, "Boys, we'll make a profit on this with LeTourneau Carryall Scrapers, a Heavy Duty Rooter and an Angledozer." That, aside from a compressor and a few jackhammers, is all the equipment represented on this 350,000 cu. yd. cut and fill job.

Most of the formations must be shot; even so, the Rooter is saving many blasting dollars by breaking the larger chunks for fast Carryall loading. Some rock is broken entirely with the Rooter, which gives perfect Carryall breakage wherever the teeth will penetrate. As for the Carryall Scrapers, they're getting good average pay loads with blades that have seen as much as 700 hours service.

Like Fred Kutzke's competitors, some day you'll run into a tough job that you hadn't counted on. Will you be forced to stand by, wondering where your costly methods can be used? Or, will the scrapers you bought after tests in "ordinary" dirt stand the punishment LeTourneau Carryalls have gone through time after time . . . and come out on the profit side? Remember, if your Scrapers will produce profits in rock, you need never worry about profits in dirt . . . sand . . . gravel . . . mud . . . gumbo . . . shale.

Ask your "Caterpillar" dealer *today* for a LeTourneau demonstration . . . if you want to be in the profits *tomorrow*.

LETOURNEAU

R. G. LeTOURNEAU, Inc., Peoria, Illinois • Stockton, California • Cable address: "Bobletorno"

Manufacturers of: Angledozers*, Buggies*, Bulldozers, Carryall* Scrapers, Cranes, Drag Scrapers, Power Control Units, Rooters*, Treedozers.

*Name registered U. S. Patent Office.

Baton Rouge Bridge Over the Mississippi

Long High-Water Crest on River Delayed Piers, But Work on Approaches Has Progressed Rapidly

✦ WORK on the Mississippi River Bridge at Baton Rouge, La., was started in June 1937, by the Louisiana Highway Commission with the cooperation of the U.S. Bureau of Public Roads through Federal Aid. The $9,000,000 structure is located about 3 miles north of Baton Rouge and one mile north of the docks of the Standard Oil Refinery. Location downstream of these docks would have necessitated a vertical clearance of 135 feet whereas the clearance permissible above is only 65 feet. Further, the site chosen reduces the length of the east approach because it is located on a bluff. The total length of the combined railroad and highway bridge is 12,211 feet. It provides for a single railroad track and two lanes of roadway, one on either side of the central railroad track.

The bridge consists of a 650-foot center span, two 848-foot intermediate cantilever spans, two 490-foot shore anchor spans and approaches consisting of a series of 43, 80, and 83-foot plate-girder spans on steel towers. The railroad viaduct on the east approach is 3,586 feet long while the highway viaduct is 835 feet. On the west approach where the terrain is flatter, the railroad viaduct is 5,299 feet long and the road viaduct 1,719 feet. The bridge proper is 3,326 feet in length, comprising the five spans mentioned above.

Substructure of Main Bridge

Contract 1 for the substructure of the main river bridge consisting of six piers was awarded to the Kansas City Bridge Co. of Kansas City, Mo., on its bid of $2,421,980.00 with completion required in 350 working days. The work order was issued on June 28, 1937. Pier 1 is a cylindrical concrete caisson 47 feet 6 inches in diameter with a single dredging well 28 feet 6 inches in diameter. It is being sunk by open dredging to 80 feet below low water elevation, then capped at 20 feet above low water and carrying a conventional pier shaft to the bridge seat at 105 feet above low water.

Piers 2, 3, 4 and 5 consist of rectangular concrete caissons each with twelve dredging wells sunk by open dredging to the following elevations: Pier 2 to 180 feet below low water; Pier 3 to 160 feet; Pier 4 to 180 feet; Pier 5 to 110 feet. The caissons for Piers 2, 3 and 4 will be capped at 25 feet below low water and for Pier 5 at 5 feet below. The pier shafts are all to be capped at elevation 105 above low water. The sand island method is being used for the sinking of the caissons on Piers 3 and 4 and will be described in the next article in this series of three.

Pier 6 is a spread footing supported by 400 timber piles each 50 feet in length. The elevation of the bottom of the footing is at low water elevation.

The principal quantities involved in Contract No. 1 are:

Foundation excavation	107,400 cubic yards
Class A concrete	18,700 cubic yards
Reinforcing steel	3,533,000 pounds
Structural steel	846,000 pounds
Class B concrete	52,000 cubic yards
Test piles	2 piles
Untreated timber foundation piles	24,000 feet

Main Bridge Superstructure

The contract for the main bridge superstructure consisting of the five steel spans was awarded to the Bethlehem Steel Co., Bethlehem, Pa., on its bid of $3,705,855.00 and the work order was issued June 28, 1937. Span 1, from the east end, is a 490-foot anchor arm. Span 2 is a 848-foot cantilever span made up of 2,226 feet of cantilever arms and a 396-foot suspended span. Span 3 is a 650-foot anchor span, Span 4 is the same as Span 2, and Span 5 is the same as Span 1. The trusses are spaced 32 feet center to center with the single railroad track in the center and a 20-foot concrete roadway cantilevered on either side with a 2-foot 6-inch sidewalk.

The principal quantities involved in Contract 2 are:

Carbon steel	7,000,000 pounds
Reinforcing steel	836,000 pounds
Silicon steel	31,500,000 pounds
Steel castings	1,000,000 pounds
Class A concrete	3,200 cubic yards
Cross ties	2,950 ties
Steel rails	355,000 pounds
Track fastenings	120,000 pounds

Foundations for Approach Trestle

Contract 3 for the foundations for the approach trestle, concrete pedestals on concrete piling, was awarded to the Uvalde Construction Co. of Dallas, Texas, on its bid of $598,320.49 and the work order was issued August 10, 1937. The length of the east approach, according to the contract, is 3,586 feet and the west approach, 5,300 feet.

The major quantities on Contract 3 are:

Borrow	44,000 cubic yards
Foundation excavation	13,020 cubic yards
Test piles	29 piles
Concrete piling, 14-inch square	52,140 feet
Concrete piling, 16-inch square	154,280 feet
Concrete piling, 18-inch square	1,760 feet
Class A concrete	8,491 cubic yards
Reinforcing steel	502,600 pounds

Superstructure of Approaches

The contract, No. 4, for the superstructure of the approaches consisting of alternating 43-foot towers and 83-foot 3½-inch girder spans, was awarded to the Steel Construction Co. of Birmingham, Ala., on its bid of $1,634,563.40, and the work order was issued August 10, 1937.

The major quantities on Contract 4 are:

Carbon steel	13,000,000 pounds
Silicon steel	10,000,000 pounds
Creosoted ties	7,630 ties
Steel rails	950,000 pounds
Rail fastenings	320,000 pounds
Reinforcing steel	650,000 pounds
Class A concrete	2,700 cubic yards

Personnel

The surveys, plans and specifications for the entire project were made by the Bridge Department of the Louisiana Highway Commission and all engineering and supervision is being done by that department. H. B. Henderlite is State Highway Engineer, N. E. Lant is Bridge Engineer, E. L. Erickson is Assistant Bridge Engineer in charge of the Baton Rouge Bridge, Phillip Angier is Resident Engineer for Contract 1 and George Robert is Resident Engineer for Contracts 3 and 4.

Sand and Gravel Equipment

Rogers crushing, sizing, conveying and storing equipment for handling stone, gravel and sand is described and illustrated in a 32-page booklet issued by the Rogers Iron Works Co., Joplin, Mo. Included in this line of equipment are crushers of all sizes and mountings, revolving and vibrating screens, conveyors, storage bins and a variety of portable and semi-portable plants designed to meet any special needs.

Copies of this Bulletin No. 302 may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning CONTRACTORS & ENGINEERS MONTHLY.

Engineers!

MAKE VISUAL PHOTOGRAPHIC REPORTS OF PROGRESS
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NEW in PRINCIPLE and PERFORMANCE

The Owen COMBINATION Orange Peel
GRAPPLE AND BUCKET

This unit embodies an entirely new mechanical principle in the independent action of each jaw. The jaw meeting the least resistance penetrates deeply into the material and anchors, to be likewise followed by the other jaws. This results in greater efficiency and more profitable operation when used as a rock grapple or an orange peel bucket.

THE OWEN BUCKET CO.
6030 Breakwater Ave., Cleveland, Ohio
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

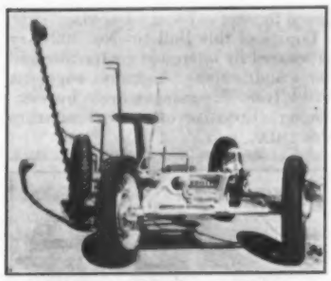
The Model No. 84-HD is made in sizes from 50 to 210 gallon capacities. Each kettle is mounted on semi-elliptical springs, has Timken bearing wheels. The new channel iron leg which is automatic in action adds to the sturdiness of this model. The above photo shows how easy it is to operate Model No. 84-HD.

A JOB WELL DONE
With No. 84-HD Kettle

This improved Model No. 84-HD Kettle has, through actual tests, saved money on road maintenance work. Equipped with a Littleford Hand Spray Attachment, it provides better penetration and covers a wider area—saves on material. Model No. 84-HD has two exclusive features, "Double Heating Circulation" and the "Screened Reservoir."

These features combined save users one gallon of fuel for every four used and heat 20% faster than ordinary kettles. A job is well done when a Model No. 84-HD is used.

LITTLEFORD
LITTLEFORD BROS.
455 EAST PEARL STREET
CINCINNATI, OHIO



The New Drott Highway Mower

New Highway Mower

The new Drott highway mower, recently announced by the Drott Tractor Co., Inc., Milwaukee, Wis., is designed for use with any light truck. The mower is attached to the truck with a 15-foot flexible drawbar permitting the operator to cut slopes and ditches, with fast steering to cut around culverts, posts, guard rails and other obstructions without the truck changing its line of travel.

The mower has a standard cutter bar of 5 feet. All gears are enclosed and run in oil. All revolving shafts are roller and ball-bearing equipped and two sickle speeds are obtained while the mower is in motion. The sickle bar is raised vertically and will cut a 25-degree slope either above or below ground level. An automatic safety hitch is provided to avoid damage to the bar when it strikes an unyielding object. The pulling draft through the safety hitch is placed directly at the heel of the mower bar having spring tension to reduce vibration.

Detailed information on these new highway mowers may be secured direct from the manufacturer by mentioning this magazine.

Bulletin on Hard-Surfacing Road-Building Equipment

Two new hard-facing electrodes for use with the electric or oxy-acetylene welding process have just been announced by the J. D. Adams Co., Indianapolis, Ind. The HFA and HFB electrodes are designed particularly for hard-facing excavating and road-building equipment which is subjected to hard wear and abrasion.

The HFA electrode forms a hard wear-resisting surface especially resistant to mechanical shock and is recommended for applications where impact on the abrasive materials causes wear or failure. The HFB electrode deposits a harder surface and is recommended for all applications where the maximum abrasion resistance is required. Equipment requiring such applications can easily be hard-surfaced in the field with a portable welding outfit and these electrodes.

Copies of the new bulletins containing complete information on these electrodes and their use on construction jobs may be secured direct from the manufacturer.

Dispenser for Salt Tablets For Preventing Heat Sickness

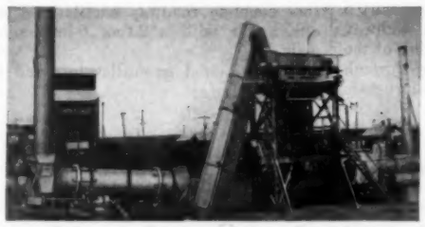
During the summer, men working on construction jobs under the broiling sun or in enclosed areas where the working conditions are very hot are subject to "heat sickness" which is caused by the loss of salt from the body due to excessive perspiration. Medical research has definitely established that the regular use of salt tablets is a safe and efficient method of renewing this supply of salt and on many construction jobs the men are required to take them regularly.

The M. S. A. Bakelite salt tablet dispenser, with a capacity of 350 10-grain tablets, is a handy and sanitary device for providing workmen with necessary salt. The unit is streamlined and sealed to shed water when exposed to the weather, is easily refilled and accurately dispenses one tablet at a time. When it is placed close to the drinking water supply, the men are reminded and find it easy to take the tablets, usually from two to six tablets a day being required.

The M. S. A. One-at-a-time Pocket Dispenser, designed for individuals who prefer to, or must carry their own salt tablet supply, is a metal case containing 24 10-grain salt tablets. It has a sanitary dispensing mechanism that supplies one tablet at a time, without contaminating or spilling remaining tablets.

MADSEN ASPHALT PLANT

The Madsen Asphalt Plant is the finest equipment of its type. It is built in units to assure rapid assembly and dismantling, thereby providing extreme portability and low moving costs. No crane is necessary in the erection of the plant.



Remember too that a Madsen Plant holds the record in the State of California for the highest asphaltic concrete production per eight-hour day.

Write for descriptive literature.

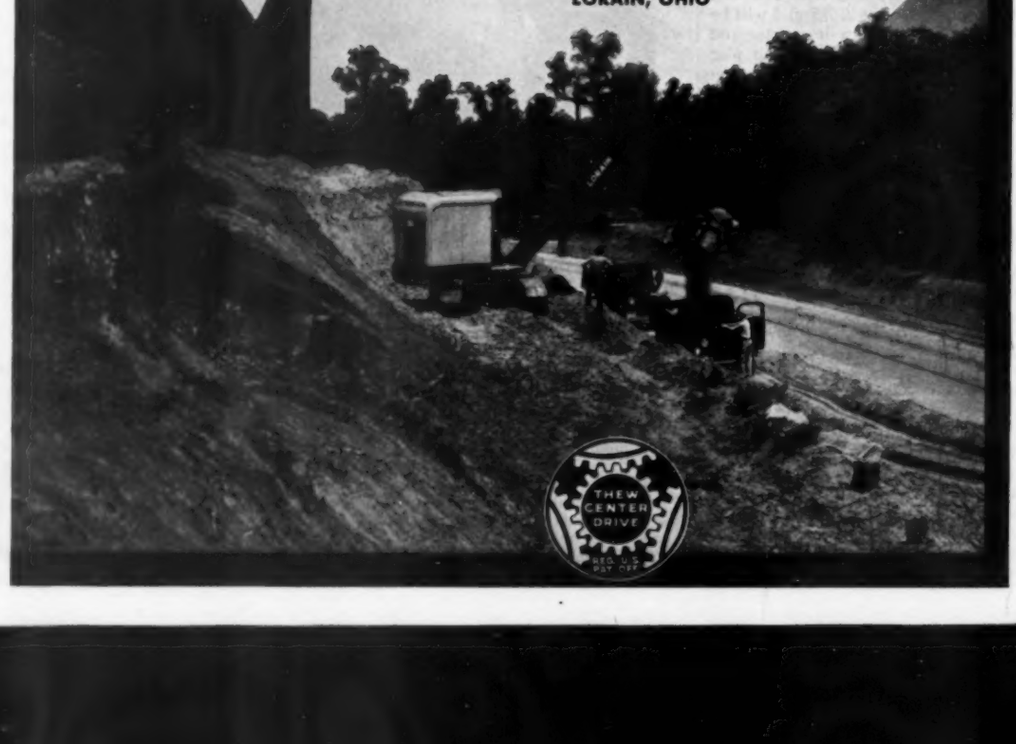
MADSEN IRON WORKS
Manufacturers
Huntington Park, Calif.

3/4-YD. LORAIN-40 BREAKS THE BANK

• The man who breaks the bank is a lucky gambler. But W.H. Armstrong & Co. of Washington, D.C., were certain winners when they pitted the skill of their ¾-yd. Lorain-40 against this 9000-yd. bank of hard Virginia clay. For despite the odds, this "40" shovel is digging and loading into trucks an average of 800 yds. every 10 to 12 hours.

Through Center Drive design, the ¾-yd. Lorain-40 offers you a sure-fire profit-winning combination in direct-to-the-point power, increased capacities, and a more simplified and stronger construction. And remember this—although it is the most-copied ¾-yd. shovel and crane in America, only the "40" can give these features. Write today for catalog. Compare the machine and its record. Then judge for yourself.

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL CO.
LORAIN, OHIO



WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

•

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

Raising Sunken Slabs On Missouri Highways

(*Continued from page 2*)

pull the outfit from job to job, signs, barricades and the necessary small hand tools.

Organization

The crew usually consists of a foreman who directs both the core-drilling and Mud-Jack crews, two core-drill operators, one feeder, one mixer operator, one hose man and helper, two men who keep the pavement clean, etc., one water-truck driver, one dump-truck driver and one dirt loader.

Cost Data

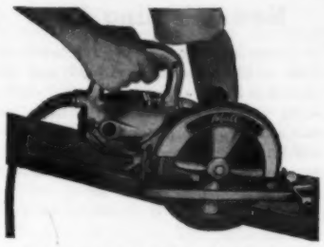
The cost of drilling these holes varies greatly with the different types of aggregate used in the pavement. A tabulation of the cost per hole for the entire state in 1934 is shown below:

Type of Aggregate	Cost Per Hole
All flint	$0.649
All gravel, plain	0.587
All gravel, reinforced	0.856
All limestone, plain	0.281
All limestone, reinforced	0.409

In 1933, one Mud-Jack unit averaged 43 cents per square yard, or $5.95 per cubic yard of material pumped in place. Another unit averaged 31 cents per square yard or $6.35 per cubic yard.

In 1934 one unit raised 36,771 square yards of pavement at a cost of 23.6 cents per square yard, using 1,580.5 cubic yards of material at a cost of $5.48 per cubic yard. Another unit raised 42,166 square yards of pavement at a cost of 23 cents per square yard, using 2,217 cubic yards of material at a cost of $4.36 per cubic yard.

During 1937, 9,758 holes were drilled with core drills in pavement in Division 4 at a cost of 34.4 cents a hole with a total cost of $3,359.31. Of this total number of holes, 338 were drilled in gravel aggregate pavement, 2,127 in reinforced limestone aggregate pavement, and 7,293 in plain limestone aggregate pavement. In this same Division, 43,696 square yards of concrete pavement was raised with Mud-Jacks, at a total cost of $9,468.72 and an average cost per square yard of 21.7 cents. In the course of this work, 1,676.5 cubic yards of dirt was pumped under the pavement at an average cost of $5.65 per cubic yard of material.



The New Mall Model 1A Hand-Saw

New Electric Hand-Saw

The new Model 1A electric hand-saw, recently announced by the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill., weighs only 18 pounds and is balanced for true one-hand operation, according to the manufacturer. The Mall patented spring-operated telescoping safety guard gives complete protection without interfering with the operation of the saw. Another feature of this new unit is that no sawdust can get in the operator's eyes nor can sawdust cover the cutting line.

The Model 1A can cut 2-inch lumber at a 45-degree angle and on straight cuts has a capacity of 2⅜ inches. Abrasive discs or cut-off wheels can be furnished for cutting or scoring tile, marble, stone, gypsum and light-gage steel.

Earth-Moving Booklet

Earth moving in all parts of the world and under all types of climatic and soil conditions is described and illustrated in a new booklet "Earth Moving Throughout the World," recently issued by the Caterpillar Tractor Co., Peoria, Ill.

Road construction and maintenance, airport work, reservoirs and general construction are discussed in separate sections. Allied equipment and its proper application on earth-moving work, as well as cost figures, is included. Each job mentioned is illustrated with action pictures.

Copies of this booklet may be secured direct from the Caterpillar Tractor Co.

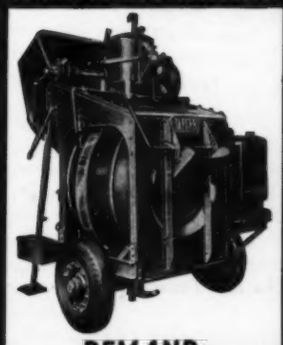
NEW 6" PUMP

Heavy-duty design. Ideal for wellpoint service, bridge pier holes, etc., when large capacity is required.
Compact design. Oil seal eliminating packing. Tremendous capacity—90,000 gph. Automatic priming, without handles requiring adjustment. Easy accessibility.

Ask for Bulletin CEM-38

MARLOW PUMPS
Ridgewood New Jersey

BUYING A MIXER?



DEMAND:

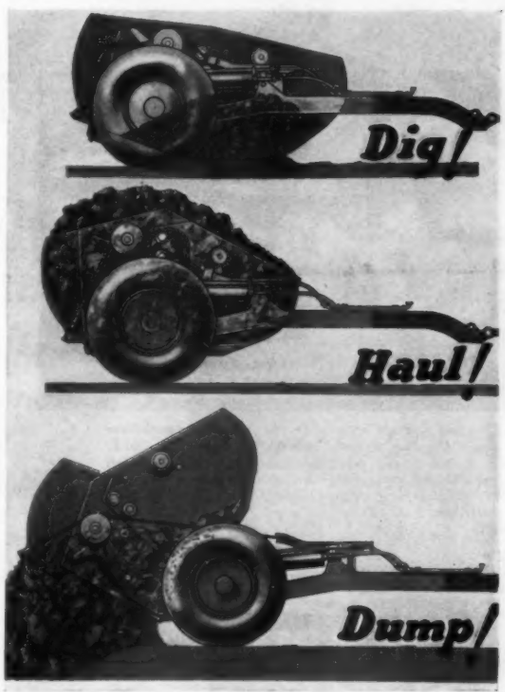
- Faster Charging and Discharge Speeds,
- Machined Steel Tracks,
- 2 Wheel Mounting with Timkens and Pneumatics,
- End Discharge Advantages,
- Man-Ten Alloy Steel,

Send for New Catalog, Prices 3½S to 56S Sizes.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

Why CONTINENTALS MOVE Dirt FASTER and CHEAPER!



They get down and dig. The wheels don't hinder the digging operation—rather, they aid it by adding their weight on the cutting blade. The sharp curved cutting blade planes off a layer of soil whether it's loose or packed hard, and routes it up into the digging bucket where it tumbles over onto the front dirt carrying apron out of the way of the incoming load. Digging depth is readily controllable—from 0" to 12".

While they're digging and loading, they're hauling; on their way to the dump. That's why Continentals move dirt faster—because they haul while they dig and load—saving as they go by replacing costlier dirt handling equipment and doing a better job faster. Continentals move dirt, sand, gravel, gumbo, shot rock, imbedded roots; in fact, anything the tractor can pull through, and they'll dump anything that they load.

They back-dump like a truck out of the way of the wheels, over a bank, into water, against a wall, in windrows or stock piles; and are used for spreading, grading and leveling, too. No need for bulldozing with a Continental on the job. They use no troublesome cables, no winches, no counterbalances — just the simple Be-Ge Hydraulic Control Unit. Operating a Continental is as easy as turning on a faucet. The operator is an expert after a few round trips. Maintenance, too, is simple—just occasional lubrication and keeping the pump tank full.

A 7 yd. Continental on Crawlers doing a tough stripping job on an Ohio fill project. On this, as on all dirt moving jobs, Continentals do it faster and cheaper!

In any kind of soil, under any conditions, Continentals move dirt at the lowest per yard cost whether you use a 4, 5, 7 or 10 yd. model on crawlers or low pressure tires. Continentals dig out profits for you that you never knew existed. By all means get the complete story before buying dirt moving equipment for your next job.

Sold and serviced by Allis-Chalmers dealers everywhere.

CONTINENTAL ROLL & STEEL FOUNDRY CO.
Tractor Equipment Division
Railroad Ave. EAST CHICAGO, INDIANA

CONTINENTAL WAGON SCRAPERS

The New Wisconsin Model AM4 Air-Cooled Engine

A New 4-Cylinder Air-Cooled Engine

Some of the features of the Model AM4 25-hp 4-cylinder air-cooled engine recently announced by the Wisconsin Motor Corp., Milwaukee, Wis., are its light weight of 340 pounds, complete with accessories; Timken roller bearings on the crankshaft front and rear; valve seat inserts; cylinder block and crankcase cast separately for economical servicing; and automatic lubrication from the oiling system for all parts.

The new Model AM4 has a 3¼-inch bore x 4-inch stroke and develops 16 hp at 1,200 rpm, 22 hp at 1,600 rpm, 25 hp at 1,800 rpm with a peak of 28 hp at 2,400 rpm. With the addition of this new unit to its line, the Wisconsin Motor Corp. now makes air-cooled engines ranging in size from 1 to 28 hp in single and 4-cylinder models.

New ¾-Yard Excavator Has New Type of Drive

One of the features of the new fully convertible P & H Model 255 excavator, recently announced by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., is the new P & H High Leverage Drive. This type of drive and method of controlling the operating functions of the machine are new to the excavator industry, according to the manufacturer, although they have been used for many years in other types of material-handling equipment.

Employing the principle used in modern automobiles where high horsepower is transmitted through a small clutch operating at high speed and at low pressure on the clutch discs, the High Leverage Drive is arranged so that the clutches and brakes exert a high leverage on the actual load when driving all the operating parts of the machine. The final gear or sprocket reduction has a relatively high ratio in all cases. This feature of the design keeps the stresses in the working shaft and gearing very low, resulting in low maintenance cost.

Throughout the construction of the 255 rolled alloy steels and P & H all-welded design have been used to combine greater strength with less weight. Hoist and digging drums are of ample size to accommodate the amount of cable required for operating with a 40-foot boom without overlapping the cable on the drum. The machine is equipped with a three-speed transmission which enables the operator to select the most advantageous speed for each of the motions of the machine. The tractor-type crawlers are self-cleaning and so constructed that any individual shoe can readily be removed if necessary without disturbing the links themselves. A modern full-vision cab on this new ¾-yard machine, equipped with shatterproof glass, affords the operator the greatest possible vision for operation with ease even under trying conditions.

Other features include a truss-type gantry to eliminate any deflection in the base plate and to maintain alignment; a live roller circle that carries the upper revolving deck as on a huge roller bearing; compensator springs for the crawler track; flexible drive shaft to eliminate driving stress and strains; double heat-treated gearing used throughout and a live-type boom with P & H positive chain crowd.

New Welding Hose

A new welding hose, known as Great Seal welding hose NY-10003 and designed to guard against accidental explosions caused when both gas lines are subjected to sparks and hot metals in welding operations, has recently been announced by the New York Belting & Packing Co., Passaic, N. J.

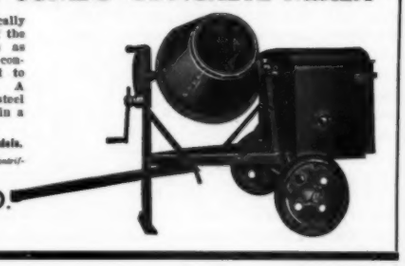
This hose, which is made in four sizes, including ¼ and 5/16-inch inside diameter in three ply and ⅜ and ½-inch inside diameter four ply, is constructed of an oxygen and acetylene-resisting rubber tube covered with two or three plies of strong light-weight duck. Over these duck plies is braided the safety ply of high-tensile asbestos yarn which prevents hot sparks and metals penetrating the hose. The cover is of high-quality stock in red, green or black.

NELSON 3½ FOOT JUMBO CONCRETE MIXER

These full half-bag mixers, economically and efficiently handle all the work of the small and medium-sized contractors as well as the small jobs of the big contractors. The mixer is well braced to withstand hard knocks and abuse. A strong frame built of two heavy 3" steel channels supports an engine enclosed in a protective housing.

Write for circular describing all 3 models.

Also manufacturers of air and water-cooled engines. Centrifugal pump units, and light and power plants.



NELSON BROS. CO.
SAGINAW, MICH.

MEET *Mr. MacDougald*

The MacDougald fleet of Chevrolet Trucks is lubricated with New Texaco Motor Oil, Marfak and Thuban; fueled with Fire-Chief.

Texaco Marfak is the ideal lubricant for wheel bearings, shackles, grease-type universal joints, steering connections, and all chassis parts. Marfak stays put, clings, protects parts from road shocks, water, and grit.

TEXACO
100
PERCENTER!

Using Texaco 100% including Texaco Crater Compound for gears and wire cable, Mr. MacDougald reports his highest regard for both products and service.

This Lima Caterpillar Diesel-powered Shovel is handled by Sam Cook, outstanding shovel operator in the Atlanta Area. Mr. Cook and Texaco 100% make an unbeatable combination. Mr. MacDougald and Mr. Stephenson are in foreground.

When The MacDougald Construction Co., of Atlanta, Georgia, gets on a job, it "goes to town"; leaves nothing to chance.

MacDougald gives special attention to lubrication . . . has proved it a big factor in preventing breakdowns and interrupted work-schedules, thus completing jobs *ahead* of schedule.

On this Newberry-to-Strother, S. C., highway job (Project 187), all Caterpillar shovels, tractors, trucks are Texaco lubricated 100%.

Trained lubrication engineers are always available to aid you with your selection and application of Texaco Lubricants. Prompt deliveries assured through 2108 warehouse plants throughout the United States. Call the nearest Texaco warehouse, or write to—
The Texas Company, 135 East 42nd Street, New York City.

TEXACO *MARFAK*

THE NATIONAL CARBIDE V-G LIGHT

Gives you daylight conditions on night jobs.
Spreads a full, even beam of 8000 candlepower right where you need it.

Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working. Weight 35 lbs. empty; 98 lbs. when full.

Write for catalogs on V-G Light, V-G Handy Light and Lantern

NATIONAL CARBIDE CORPORATION
LINCOLN BLDG. (Opp. Grand Central) NEW YORK

Federal Road Funds Withheld from Mass.

The Department of Agriculture announced recently that its findings that Massachusetts has diverted state motor vehicles revenues to other than highway purposes has made it necessary to withhold $472,862 of the Federal-Aid apportionment of $3,171,423 for the fiscal year ending June 30, 1938.

This action is made mandatory by the Hayden-Cartwright Act of 1934 which requires that Federal-Aid funds be withheld from any state using the proceeds of state motor-vehicle registration fees, gasoline taxes and other special taxes on motor-vehicle owners and operators for other than highway purposes in an amount greater than was being so used prior to June 18, 1934. The amount to be withheld may not exceed one-third of the apportionment for any fiscal year.

Under similar circumstances $250,000 was deducted from the apportionment to New Jersey for the fiscal year 1937. Maryland, Pennsylvania and Georgia were also found to have used motor vehicle revenues for non-highway purposes to such an extent as to require Federal action. However, Maryland and Pennsylvania have restored the required amounts to highway funds so that no action was taken and Georgia officials have given assurance that they will follow a similar course.

More Roads for Guatemala

A recent executive decree in Guatemala authorized an additional appropriation of $100,000 for the construction and improvement of roads of all types and other highway work, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. This brings the total funds available for road work in Guatemala for 1938 to $404,586.52.

New Equipment Distributor To Handle Koehring Line

The Contractors Equipment Corp., a new construction equipment distributor, located at 1215 S.E. Grand Ave., Portland, Ore., has recently been appointed distributor for the complete line of Koehring construction equipment in the Oregon territory by the Koehring Co., Milwaukee, Wis. The personnel of this new company, all of whom have a background of construction and equipment experience, includes O. C. Jessup, John W. Miles, Robert D. Vial and Alfred A. Carlson.

NEW! THE No. 12 "CATERPILLAR" DIESEL AUTO PATROL

HEAVY DITCH CUTS—Ample clearance between the point of the blade and the front wheel permits proper ditching position with the new "Caterpillar" No. 12 Auto Patrol. No clogging or striking of front or rear tires!

FULL-REVOLVING BLADE—The blade of the new "Caterpillar" Diesel No. 12 Auto Patrol can be set entirely within the wheels . . . or turned completely around. You'll appreciate this full-revolving feature for working in reverse on sub-grades or other jobs where the machine cannot be readily turned.

"CATERPILLAR" Auto Patrols have constantly extended their range of usefulness. *Improvements in traction . . . more blade-clearance . . . increases in power . . .* and *a greater variety of useful attachments* added to these machines keep them up-to-date and even ahead of the times!

Now the Diesel No. 12 takes its place beside the popular No. 10 and No. 11 Auto Patrols. Here, in this new machine, are *additional economies* for those who need still more power . . . more speed range . . . and more blade-scope than the other Auto Patrol models offer!

The new No. 12 is driven by a 6-cylinder, 66-horsepower "Caterpillar" Diesel Engine. It has *six* forward speeds. Its blade positions are almost unlimited. It has a greater capacity for heavier work . . . at higher speed!

Simple, trouble-free mechanical controls of the No. 12 Auto Patrol have *two* speeds. There is a slow speed for close work. And there is a higher, time-saving speed for longer blade movements. In addition, a new, high-efficiency mechanism gives an accuracy and ease of steering never before known in motor graders!

This is but a bare outline of the advantages offered by the new "Caterpillar" Diesel No. 12 Auto Patrol. See your nearest "Caterpillar" dealer, or write us direct, for more information.

HIGH BANK CUTS—With the new "Caterpillar" Diesel No. 12 Auto Patrol, high or low banks can be cut to the desired degree of slope. Changing the blade is a simple operation. It can go from a full ditching position to a back-sloping position in less than a minute . . . and without stopping the machine.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

Muskingum County Saves with Road Mix

(*Continued from page 1*)

of the road. The amount of road oil used for the binder in the road mix depends on the character of the material bladed over the road. In other words, it depends on the character of the soil in the particular section in which the road is being built. If there is more earth in one section, then the amount of oil that is applied is increased, but the average is about 0.75 gallon per square yard. The asphalt is purchased on an applied basis whereby the producer or material man bids on the road oil applied at so much per gallon.

The loose material that had been bladed across the road then receives the 0.75 gallon of asphalt for the formation of a mat about 1 inch thick. The blade makes two trips up each side, throwing the material that has been shot with the asphalt to a center windrow and mixing as it goes. The patrol grader thus completes a windrow not more than 6 inches high and twice as wide in the center of the road. If the material runs greater than this, the patrol grader is used to flatten the windrow, but usually the windrow is of minimum height and the county's Gledhill road shaper is pulled behind a truck to give the final mixing and to spread the material evenly. Traffic is then admitted to the road to bind the surface.

On some roads where a variable amount of gravel was brought in to increase the coarse material on the surface for the road-mix top AE-2, an asphalt emulsion, was used for the binder material. This is new for Muskingum County but has been very successful and its use will probably be increased. Where the emulsion was used a 5-ton roller was used for compacting the road before traffic was admitted.

Muskingum County

Muskingum County is located in southeastern Ohio in a rolling country where a level grade is an exception. The section has been made better known to the world in the last five years by the construction of the series of flood-control dams by the Muskingum Conservancy District under the direction of the U. S. Engineer Department. (C. & E.M. Nov., 1935, pg. 2; Dec., pg. 1; Jan., 1936, pg. 5; Feb., pg. 15; Mar., pg. 11; Apr., pg. 20; May, pg. 19.) Zanesville is the county seat.

There are 656 square miles in Muskingum County and approximately 522 miles of county roads. There has been considerable shifting of roads between the State and the County and also between the townships and the County.

County Highway Equipment

The equipment owned by Muskingum County for its road work includes a considerable number of trucks and passenger cars for the use of the engineer officials in covering the work and much grading equipment.

The truck equipment, all 1½-ton units, is as follows: 4 Fords, 3 Chevrolets, 2 Studebakers, 2 Internationals, 2 Reos, a Dodge, a Ford pick-up truck for the mechanic and a Chevrolet station wagon for the survey party. The passenger cars include: a Ford coupe for the Road Supervisor, two Ford Tudor sedans and a Chevrolet sedan for the administrative officials.

The road building and maintenance equipment includes: two 30-hp tractors, one 60-hp tractor, one Allis-Chalmers Model L 75 tractor, two Wehr maintainers, one Fordson maintainer, one Allis-Chalmers Model 42 maintainer, one Allis-Chalmers Model 54 power grader, one Adams maintainer, one Adams Model 50 power grader, one Adams 301 power grader, one Quick-Way shovel, one Gledhill shaper, five Maneys, three concrete mixers, four graders, one sand blaster, one air compressor, two water pumps, one pitcher pump, one steel bender, one lime spreader, one rooter, one Silver King mower and one Continental scraper.

The annual highway budget of Muskingum County is approximately $145,000.

Want information? Write the Editor.

MALL Vibrator with Gas Engine Power Unit

YOU NEED CONCRETE VIBRATORS FOR BETTER QUALITY CONCRETE

and when you are considering vibratory equipment, don't overlook the many superior features of

Mall TRADE MARK CONCRETE VIBRATORS

They are designed and built to stand up under the toughest job conditions. There is a model with the proper vibration frequency for every specification—5000 r.p.m., 7000 r.p.m. and 10,000 r.p.m. MALL vibrators will solve your concrete placing problems, produce superior concrete, and save you money!

Write for bulletins describing the various gas engine and electric models

MALL TOOL COMPANY

7741 SOUTH CHICAGO AVENUE CHICAGO, ILLINOIS

OFFICES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Again ADNUNS four more makes SIX for ALABAMA

Adnun Black Top Paver showing hydraulic controls

ANOTHER State specifies Adnun. The Alabama State Highway Department has just taken delivery on four more Adnun Black Top Pavers, making a total of six of these machines for this State.

Alabama is only one of the many states using Adnuns. Among them are the State of New York with nine Adnuns, and the State of Pennsylvania with eighteen Adnuns. If you have a Black Top road job, you'll make more money with an Adnun.

THE FOOTE COMPANY, INC.

NUNDA NEW YORK

ADNUN TRADE MARK REGISTERED

BLACK TOP PAVER with Hydraulic Controls

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

ALL STEEL HAND HOIST

SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE

"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ⅝" cable used:

2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" ..... 1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4, & 22 to 1	60 lb.	$50
5-Ton 4 & 24 to 1	110 lb.	$75
15-Ton 4, 19 & 109 to 1	680 lb.	$200

BEEBE BROS.

2724 6th Ave., So., SEATTLE, WASH.

Warehouse stocks for dealers' Supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

City Puts in Storm Sewer Ahead of Highway Paving

Freeland, Inc., Encounters Pipes, Cables and Floods in Work on Large Culvert in Fifth Ave., McKeesport, Pa.

(*Photo on page 36*)

✦ A NEW section of state highway has been built through McKeesport, Pa., on its main street, Fifth Avenue. This street has been the scene of many a flood when Crooked Run Creek climbed out of its banks and started down the street toward lower country. The City of McKeesport decided that it would be well to confine the stream to a box culvert or storm sewer under ground rather than put up with its damaging floods another year. Therefore before the new pavement could be laid on Fifth Avenue the culvert had to be completed. The construction of the culvert was included in the state highway project WPMS 1034A, 1936, awarded to Freeland, Inc., of Pittsburgh, Pa., but the 5 x 12-foot box culvert 1,400 feet long was paid for by the City of McKeesport. The entire grading and paving contract was 2.32 miles in length and included 143,000 cubic yards of earth and rock excavation and 20 and 36-foot concrete pavement.

Excavation for the Culvert

The excavation for the culvert and storm sewer in Fifth Avenue was not easy as the ground is all clay. The excavation went to a depth of 10 feet and was 19 feet wide to include the sanitary lines placed after the culvert was completed. It was necessary to run the 1¼-yard Speedcrane shovel on mats the entire distance of the excavation, but the mats were merely heavy timbers as there was not room to swing the mats ahead, so each timber was carried ahead by hand. The shovel loaded to trucks, some ahead at ground surface and others behind in the excavation. Part of the excavation was done in two lifts but most of it was handled as a single cut.

Fifth Avenue had the usual array of subsurface structures that the contractor had to look out for under various penalties. First there was a 12-inch high-pressure main water line carrying from 175 to 200 pounds on the west side of the trench. This had to be maintained in place during the entire work of excavation, pouring the culvert and backfilling. It was braced wherever necessary and wires run from the pipe up to suitable anchors above. Immediately below the water line was a 10 to 15-inch sanitary sewer which was maintained in service. At the bottom of the east side of the excavation the contractor had to place a new 12-inch sanitary sewer before the culvert was completed. At about the mid-depth of the trench slightly to the east of the center line a 6-inch water line had to be removed. On the east side at mid-depth a group of telephone cables had to be removed by the contractor and replaced under the sidewalks. A new cement-lined steel water line, 8 inches in diameter and with Dresser couplings, was laid where the cables had been removed and maintained in place during the latter part of the work to provide water for the adjacent properties. Five feet below the surface on the center line of the street an 8-inch live gas line had to be removed and immediately below that an old 16-inch wrought iron gas line no longer used was removed. The live line was later replaced outside the box culvert. Lastly, a 30-inch sanitary sewer of concrete pipe lined for half-depth with vitrified tile was placed outside the box culvert at the bottom of the trench on the west side. The box culvert also is lined on the bottom and up 2 feet on the sides with vitrified brick to protect the concrete from the attacks of acid drainage. Add to all this the cross mains, corner cross-overs of water and gas lines and it is not necessary to say that excavation proceeded slowly.

The Box and Forms

The 5 x 12-foot box has a parabolic invert so that the thickness of the invert varies from 15 inches at the center to 21 inches under the walls. The walls are 15 inches thick and the top deck is 15 inches thick. The box is of heavily reinforced design with 305 pounds of steel per linear foot and 2.16 cubic yards of concrete per foot, including the brick lining which is paid for as concrete.

The forms for the box were built up

(*Continued on page 29*)

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Telsmith Breaker has concrete around upper edge of its crown, and two walls 6 ft. apart form a "bridge" on which are two sets of tracks. Rock may be dumped from cars into both sides of crusher simultaneously.

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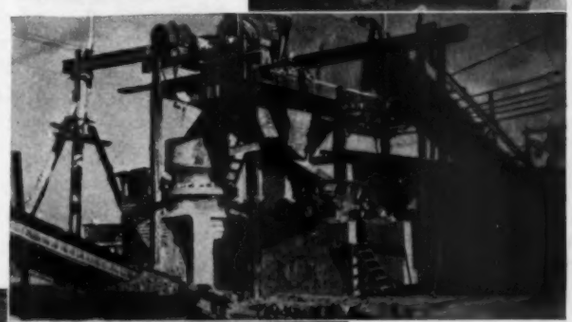
The plant pictured here is that of J. B. Ripoli & Cia. located near Olivarria, a city about 200 miles south of Buenos Aires. On an average this plant crushes about 1000 tons of very tough granite rock, per 8-hr. day, to minus 2½-in. size.

It includes two Telsmith Crushers—a 20-in. Primary Breaker and a 46-in. Reduction Crusher—shipped in December, 1931. In spite of a steady diet of hard Argentine granite, their crushing performance has been outstanding. Maintenance has been low. During its six years of service, the Reduction Crusher has had no repairs other than manganese wearing parts. The super-strong steel frame and crown and the unbreakable shaft, which distinguish Telsmith gyratory crushers, are always an assurance of continuous output.



(*above*) Crushed aggregate from Telsmith Breaker goes to a rotary scalper which removes all minus 2½ in. aggregate, and chutes oversize to a 46-B Telsmith Reduction Crusher.

(*above*) General view of plant.

(*right*) In Argentine quarries, rock is hand loaded intosidedump cars; trains are hauled up by hoist.

Top of TelsmithBreaker showing its massive crown arms set at right angles to car tracks; and great spread of its receiving bowl.

Telsmith quarry and gravel pit equipment, from crushers to bin gates, and Telsmith engineering service are described in Bulletin Q-*34. Write for it.* Q-C1-35

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ELKHART INDIANA

Handling Concrete For Imperial Dam

(*Continued from page 2*)

low the dam. The downstream dike was riprapped with stone. A cofferdam was built above the new construction area by dumping earth and rock off the old wooden construction bridge.

Excavation

The site of the upstream slab, weir and downstream apron was excavated with a Northwest 2½-yard dragline, loading to dump trucks. Enough backfill of selected material was then hauled in with a fleet of Euclid Trac-Truks and International dump trucks to form a compacted fill 2 feet thick under the upstream and downstream aprons and 10 to 12 feet thick under the weir. This was leveled by Caterpillar and Allis-Chalmers tractors with Le Tourneau and Baker bulldozers and compacted in 6-inch layers with sheepsfoot rollers. A smooth surface was obtained by a final compaction with a small Buffalo-Springfield roller. A Bucyrus-Armstrong well drill was used to sink eight 8-inch test holes 70 feet deep to determine the foundation materials at the site.

Unwatering and Dewatering

Numerous wellpoint pumps and deep-well units have been required to unwater the site of the overflow section where the greatest seepage of the entire job was encountered. The discharge recorded for October 31 was 18,000 gallons a minute. Above the upstream apron two 6-inch header lines, with 1½-inch wellpoints spaced 3 feet apart and connected to twelve Rex and Complete pumps, are used. Just below the downstream apron is a row of five 12-inch, two 10-inch, and one 14-inch Byron Jackson deep-well pumps with specially constructed intake pipes extending 50 feet below the normal ground level. A sump hole at the west end of the site is unwatered with a 12-inch Crane centrifugal pump direct-connected to a 200-hp Westinghouse motor, a 12-inch Byron Jackson centrifugal pump direct-connected to a 150-hp Allis-Chalmers motor and an 8-inch Byron Jackson with 50-hp Westinghouse motor. The latter pump is used as a spare and is connected to a 20-inch discharge pipe, into which the 12-inch line from the other Byron Jackson pump is welded. A 20-inch discharge line is also used with the Crane pump, the object being to cut down friction. Used pipe already on hand was prepared by welding. A few other pumps are used in the excavation at interior points.

Forms and Reinforcing

Pouring began at the Arizona end, and for a time a Pumpcrete line was used from it to the downstream apron and a branch line to the upstream paving slab. On the apron well-oiled wooden forms are used, held inside by angle braces of 1½-inch pipe, with a bolt threaded into a nut welded to the end. The bolt is set against a 12 x 12 x 4-inch precast concrete block placed on the surface and used to adjust the form. These braces are left in when pouring begins. Wooden wales are used on the outside of the forms with outside angle bracing, as well as she-bolts leading to brace rods inside, which are left imbedded in the slab. The single mat of 1-inch round reinforcing near the top face of the slab is spaced 12 inches both ways and is supported by precast 4 x 4-inch concrete posts which are left in.

Expansion Joints

A sheet of ½-inch asphaltic filler is placed in the joints, with a modified bulb angle anchored at each side of the joint by anchor straps welded to them. Bronze track bolts on 12-inch centers

Sump Pumps at the West End of the Spillway Section

in the horizontal leg of the angle hold a rubber sealing strip in place over the joint. The top leg of the angle is countersunk by temporarily using a wooden strip on top of it, so that when the sealing strip is in place it and the metal strips over it will be flush with the slab. The joint, including the surface of the angle, is painted with hot pitch. All joints in rubber seals are vulcanized and the angle joints butt welded.

Concrete Plants

The concrete plants are of all-steel construction, including the framing, and are alike. At the plant at the California abutment sand and gravel, washed and sized under a separate contract, are dumped from trucks to a 5-yard hopper. They are carried to the top of the plant by an 80-foot elevator with 20 x 8 x 11¾-inch buckets mounted on a continuous strand of Rex 102½ combination chain, and driven by a 30-hp motor on the top of the platform.

The aggregates pass from the elevator through a gravity chute 18 feet long to a turn head which distributes them through short chutes to any one of six buffer bins within a steel shell holding a total of 205 cubic yards. From these bins the aggregates are drawn into the batchers and thence to the Rex 2-yard mixer.

Bulk cement is unloaded from railroad cars with a flat hand-guided power shovel into a screw conveyor 11 feet long which moves the cement from the hopper to the boot of an 84-foot elevator with a water-tight metal housing and driven by a 10-hp motor with magnetic brake. The cement is delivered by a 16-foot pipe to a 30-cubic foot bin over the batching floor or through a 25-foot pipe to a 4,000-barrel silo 24 feet in diameter.

(*Continued on next page*)

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CONSTRUCTION EQUIPMENT • MILWAUKEE, WISCONSIN

Dam Concrete Placed By Buckets in Ariz.

(*Continued from preceding page*)

Cement for the Arizona mixing plant, which has no railroad spur, is trucked in covered metal bodies loaded from a hopper filled from the bottom of the silo by a 14-foot screw conveyor. Water for the mixer is measured by a Trident meter and the concrete passes by gravity from the mixer to a loading hopper, and then to the truck-mounted mixers. Until recently a Rex double Pumpcrete unit with re-mixer was used at the bottom of each plant, with 8-inch pipe lines leading from them to the construction areas. Structures for both ends of the dam, except the sluiceway, and for part of the overflow section were poured with the Pumpcrete units.

Concreting

Construction is by units 78 feet 6 inches long x 66 feet 3⅛ inches wide. While the Pumpcrete line was used in pouring, it was supported on a trestle at the top elevation of the dam, with five articulated metal chutes and five elephant trunks to each for placing the concrete. Posts 6 inches square for the trestlework were supported on square plates welded to the end of 8-foot sections of railroad steel, set vertically on concrete blocks, with the top end welded to the reinforcing mat. In pouring part of the upstream slab with the Pumpcrete line the latter was supported on four-legged trestles which were removed before finishing a strip of slab. Later, work on this slab was suspended and the pouring of the downstream slab and the weir carried ahead in that order. With a dragline on each side of a structure to handle the pour buckets, trestle work is now eliminated, including the welded railroad steel posts. As units of the apron are completed, the bottom slab and part of the buttress walls of the weir are poured. Three truck mixers haul from the Arizona plant and four from the California plant.

All concrete surfaces are kept wet for 14 days. Sand excavated from the downstream riprap area is loaded with the Northwest 3-yard dragline into Euclid Trac-Truks and hauled to the sections of the downstream apron which have set and is used in covering the concrete. It is spread with bulldozers on Allis-Chalmers tractors. At the same time, dry rock is hauled in International 8-yard dump trucks to finished sections of the apron excavation.

The sluiceway gates structure at the west end of the overflow section is nearing completion, having been poured on November 12 to an elevation above the gate openings, using a dragline and pour bucket as on the weir. The gates measure 7 x 16 feet. There are fifteen buttresses in the three overflow units measuring 3 feet 6 inches thick, except those at the ends and at unit construction joints, which are 3 feet thick. The overflow unit at each end of the sluiceway has been poured to the top elevation. Sectional wood forms on the sluiceway structure are held in place by wooden wales, with she-bolts which are left in the concrete and grouted in. All concrete at the dam is thoroughly consolidated by workmen wearing rubber boots and using Ingersoll-Rand vibrators near the forms and in close places.

Personnel

R. M. Conner is in charge of all construction work at the dam and desilting works for the contractor. L. J. Foster is Construction Engineer for the Bureau of Reclamation, with J. K. Rohrer Resident Engineer at the dam, assisted by Don M. Forester.

New P. C. A. District Engr.

The appointment of H. D. Humphries as District Engineer of the Portland Cement Association's Atlanta, Ga., office, with supervision over the work in Georgia, Florida and South Carolina, has just been announced by the Association. Mr. Humphries, who succeeds J. M. Marshall, Jr., resigned, joined the Portland Cement Association in 1933 as a field engineer in Georgia.

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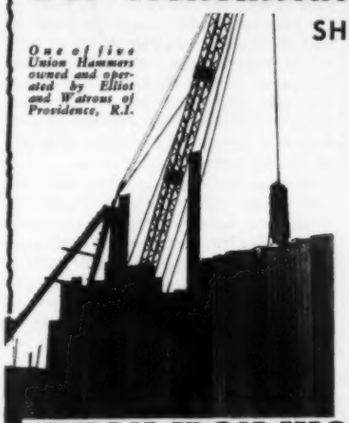

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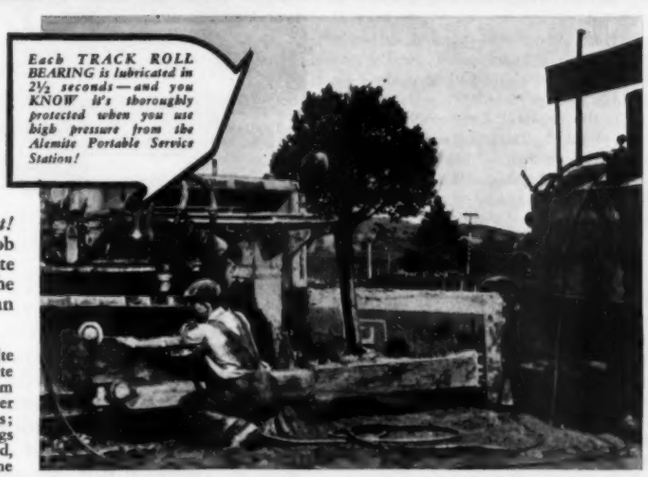
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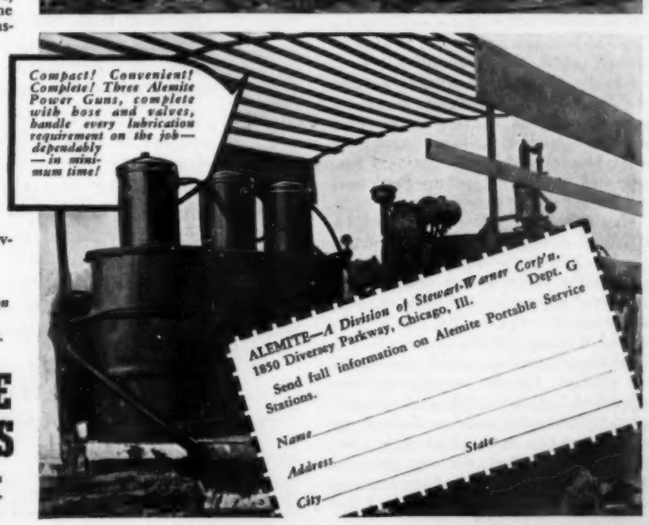
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Modern Equipment Meets Emergencies

Proof of Its Efficiency In Ability of Green Men To Maintain Schedules in San Jacinto Tunnel

By RALPH BAKER

✦ THE IMPORTANCE of equipment in modern construction was strikingly illustrated by developments in the San Jacinto tunnel of the Colorado River Aqueduct. A strike there resulted in the withdrawal of crews familiar with the peculiar working conditions prevailing in the tunnel. The strikers maintained that these conditions were such that new crews would not be able to maintain satisfactory progress nor adequate safety. Aqueduct engineers, however, were of the opinion that any crews trained in the use of modern equipment could carry on the work safely and efficiently. In other words, the issue was personnel versus equipment.

With completely reorganized crews, chosen as far as possible from men who had worked in other aqueduct tunnels, the work was continued. Figures recently released by the Metropolitan Water District show that the opinion of the engineers was more than vindicated, for the post-strike progress has actually exceeded the pre-strike rate, and the accident frequency has been greatly reduced.

This article is not concerned with the strike itself but, from the engineer's point of view, with results brought to light because of it.

Records in the Tunnel

San Jacinto tunnel is 13 miles long and 16 feet in diameter, inside the lining, and has been driven from several headings. For some time previous to the strike, work was carried on only from the inner headings of the Portero shaft on the west and Cabazon shaft on the east, both portals having been holed out to the shafts. Lawrence adit was sunk about halfway between the two shafts so that two additional headings could be established. Full crews are about 1,100 men, and some 2¼ miles of the main tunnel remain to be driven.

Work was first begun on the tunnel in May, 1933, under a contracting firm. In February, 1935, the job was taken over by the District, and has been operated since that time by force account. Progress for the three years of direct District control has averaged 21.1 feet per day, a very good average under the conditions encountered. San Jacinto, however, has never afforded easy going. On the contrary, it is the only one of the thirty-eight aqueduct tunnels in which water in excessive quantities has been encountered. The amount was so great that pumping systems had to be installed to remove it from the shafts. Water pouring down on the heads of the workers in blinding sheets and flooding the tunnel underfoot certainly provided both additional hazards and a different set-up for crews accustomed to dry tunnels.

The strike was called on August 14, 1937, and during the latter half of this month while replacements were being made, little progress was effected. At the first of September 600 men, or about half strength, were on the job, and by the end of the month 996 were employed. With crews operating considerably under full strength for the month's average, a speed of 21 feet per day was averaged, approximately the same as the average for the past two years. Portero heading was driven 170 feet, the best progress there since last June. Cabazon was advanced 460 feet, averaging 15.3 feet per day as compared with the average of 12.6 for that heading during the period from 1935.

Crews were not completed until the end of the first week in October, with 1,100 men at work. Progress steadily increased, and by the end of the month 901 feet were excavated on the main tunnel. This was an average of 28.8 feet per day, 7.7 feet better than the pre-strike average.

During the month of November the new crews really showed what they could do. Cabazon men excavated 869 feet during the month, at an average of 29 feet per day, for a single heading, an all-time record for the tunnel. The total progress for both the Cabazon and the Portero headings, amounting to 1,057 feet, at an average of 35.4 feet per day, was the best month's progress for 1937. This figure is especially noteworthy because of the heavy water inflow in Portero during the month.

When Pumps Can Not Take Care of the Inflow, Drilling is Difficult

To sum up, normal progress had been regained in close to a month's time. In three months' time it had been almost doubled, and this speed is being maintained to date. If anything, working conditions were more than usually difficult during the period. Extremely troublesome rock conditions were reported, and the heaviest inflow of water ever encountered was intercepted in the shafts. At Portero during the week ending November 17, for example, an average flow of 6,000 gpm was recorded at the face, and on the 18th the peak flow amounted to 26,000 gpm for all Portero workings.

Safety

Especially rigid observance of safety

(Continued on page 27)

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Saving an Uphill Return — Condon used this method of dumping into a ravine, thus avoided a stiff uphill return which would have been necessary had the fill been made from the bottom up.

Line of Core Drills

The complete line of Calyx core drills, designed for boring holes in rock and concrete in sizes from 2¼ to 72 inches in diameter and to depths of 2,500 feet, is described and illustrated in a new 42-page booklet recently issued by the Ingersoll-Rand Co., 11 Broadway, New York City. Seventeen models for all classes of service, such as laboratory testing, highway testing, shaft drilling, foundation testing, well drilling, exploration, and quarry drilling, are included.

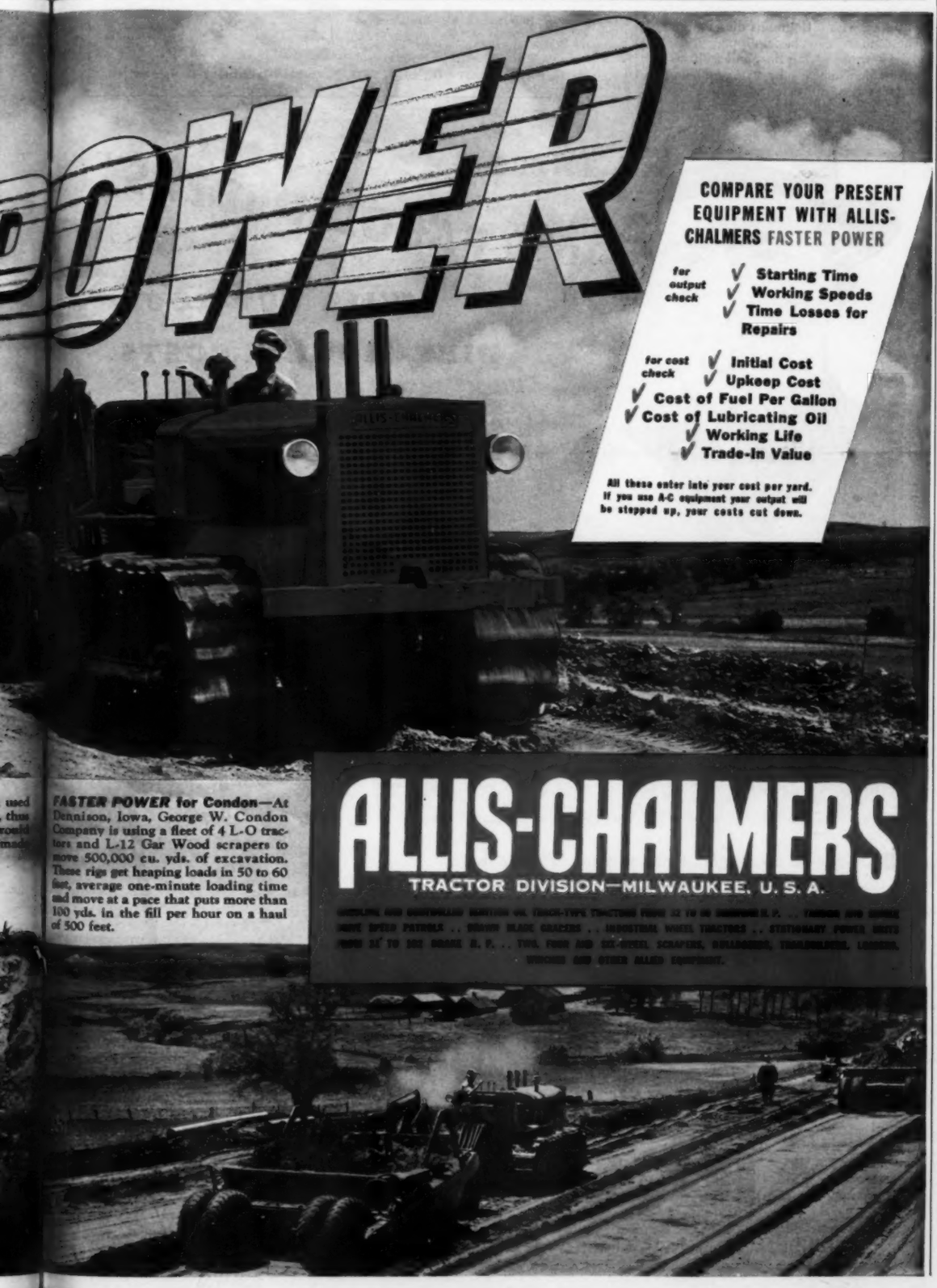
Some of these units are equipped with gasoline engines, others are designed for use with an electric motor and in others the type of power is optional.

The I-R Class M Calyx Core Drill for Truck Mounting

Complete specifications on each drill, illustrations showing these drills at work in various services in all parts of the world, and details of the drills and accessory equipment are contained in this booklet, Form 9501-A, copies of which the Ingersoll-Rand Co. will be glad to send on request.

Thornton Moves Plant

The Thornton Tandem Co., of Detroit, Mich., manufacturer of the Thornton four rear wheel drive, has announced the removal and consolidation of its Braden Avenue and McKinstrey Street plants into a larger factory building at 8701-79 Grinnell Avenue. The new building, which contains 29,840 square feet of floor space, is situated on a 5-acre site with Detroit Terminal Railroad siding facilities.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Clearing the Way For Oregon Route

Unusual Methods Included Burning Split Timber in Place, Jinny for Snaking on R. L. Houck Contract

By HENRY W. YOUNG

(*Photo on page 36*)

✦ R. L. HOUCK of Salem, Ore., bit off a sizeable chunk when he took on the Short Sand Beach Section of the Oregon Coast Highway. But he has a reputation in the Pacific Northwest for putting just such jobs through. If established methods and customs are not fast enough, he works out new methods to fit the conditions. The section was only 1.24 miles long, but walking over it just once, even after the clearing had been nearly completed, gave rise to the suspicion that the decimal point had got into the figure by mistake.

This section was one of three just south of the Arch Cape tunnel (C&EM Feb., 1938, page 27) which will complete a hard surface road along the Pacific Coast from border to border of Oregon. And it was tough. It runs through a deep gorge, subject to heavy precipitation, a short distance from the coast line. Primeval forest of spruce and hemlock with some cedar fills this gorge, along with an almost impenetrable snarl of undergrowth and down stuff. The largest tree felled was a cedar 13 feet in diameter. There were spruce and hemlock up to 10 and 12 feet, with 7 and 8 feet common. Some of the spruce had ring counts of over 700 years.

Clearing the Timber

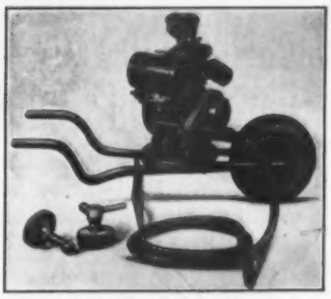
There was no way to get the trees out for lumber so they had to be burned on the spot. Houck got in there on May 10, 1937, and started clearing. On July 8, he had started grading in places. This was fast work under the conditions, but his profits depended on getting the grading done early in the fall. It was doubly necessary to rush the clearing in order to get it done before the dry season on account of the forest fire hazard. The fire warden was perhaps more lenient than ordinarily because of the special fire-fighting equipment and the large number of men he had on the job, permitting almost immediate control of any spot fire that might start outside of the burning area.

After the brush and small trees were cut and burned, experienced fallers were sent in knocking down the large trees and falling them on the hillsides or on the bottom amid a snarl of vegetation. They were high cut, leaving the stumps which would be above grade to be taken out later.

Through this mess clambered husky young lads carrying a portable boring machine. This consisted of a gasoline engine and electric generator set to furnish current for an electric drill to operate long augers. The outfit weighed close to 400 pounds, but the boys pranced around with it over huge logs and through underbrush after the manner of mountain goats. With this outfit, holes were bored to the heart in the large trees, about 8 feet apart. They were able to average about 60 holes an hour and keep ahead of the loaders who followed. The holes were then loaded with small charges of powder, preferably just enough to split the tree open but without rending it asunder.

Then followed the burners who built fires in the opened trees, and as high as 85 per cent burn was obtained right where the trees lay. Old loggers had told Houck that he could not burn them

(*Continued on page 28*)



One of the New Syntron Vibrators

Gas-Engine-Driven Concrete Vibrators

A new line of gas-engine-driven internal concrete vibrators has recently been announced by the Syntron Co., Homer City, Penna. Each outfit is complete, consisting of an engine, flexible shaft and vibrating tool.

The engine is a 3-hp air-cooled 4-cycle Wisconsin motor with automatic clutch, power take-off and all accessories. It may be mounted on a pneumatic-tired wheelbarrow chassis or on a swivel pedestal base. The flexible shaft is heavily armored, and comes in 12 and 7-foot lengths, complete with simple threaded positive couplings. The vibrating tools are in two sizes, 1⅝ x 18-inch and 2⅝ x 18-inch, made of strong steel cylinders, sealed against leakage, with an unbalanced shaft inside mounted on heavy oversize ball bearings. The speed of vibration ranges from 3,600 to 6,500 rpm and is controlled through an adjustable governor on the engine.

Complete information on this new line of vibrators, as well as a discussion of the subject of concrete vibration, may be secured direct from the manufacturer by mentioning this magazine.

Dirt-Moving Units Versatile and Sturdy

Linn tractors for hauling, dirt moving and snow removal work, made by the Linn Mfg. Corp., Morris, N. Y., combine the features of both a truck and a tractor and have in addition a number of exclusive features, according to the manufacturer.

Chief among these features is its flexible traction provided by the crawlers which have full ground contact at all times, enabling the unit to work in any type of weather and on all kinds of ground conditions. The unit is also designed to take up for wear and to prevent ice, snow, mud or rocks from clogging.

The Linn unit is operated just like a truck, with the conventional steering wheel, clutch and brakes and in addition has a reverse driver's seat and set of controls to make reverse driving simple and easy. The unit has speeds up to 12 mph and with its high speed reverse has practically the same speed ranges in both directions, thus being able to shuttle back and forth without requiring the space or losing the time for turning. The body of the unit is of sturdy construction, with maximum payload space, the actual capacity of the body depending on the model selected.

Power is furnished by a powerful gasoline engine or there is one model equipped with a Cummins diesel engine. These units can be equipped with a shovel, crane or dragline, and with snow plows for winter use by state and county highway departments.

Diesel-Electric Generators

A wide range of uses for Caterpillar-diesel-powered electric generator sets are described and illustrated in a new booklet recently issued by the Caterpillar Tractor Co. In addition to installations in quarries, on dredges and for many other types of work, the booklet gives the listed ratings of the eight sizes of Caterpillar-powered generator sets now available, ranging from 20 to 80 kw.

Copies of this booklet, Form No. 4658, may be secured by interested contractors and engineers direct from the Caterpillar Tractor Co., Peoria, Ill.

NEW WAYS TO CUT MATERIALS HANDLING COSTS

The flexibility and adaptability of the Porta "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.

Made up of independent sections. Can be used on wheel truck, caster mounting or on supports as permanent or semi-permanent conveyor. Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.

A. B. FARQUHAR CO., LIMITED, Portable Machinery Division
Clifton, N. J. YORK, PA. Chicago, Ill.

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JAEGER PAVER has 10 ADVANTAGES:

- 18 Ft. Movable Forms Give Smoothness of Concrete,
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- Capacity to 1000 Tons a Day,
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1. Rolled alloy steel unit welded excavator design
2. Tractor type crawlers
3. Positive chain crowd
4. Alloy steel boom, all-welded
5. Welded alloy dippers
6. High leverage frictions

All of the above features are used on the new P&H Model 255 —a ¾-yard shovel shown above.

● Once, even the electric starter on your car was a "new fangled idea." Yet, no automobile is sold without it now. Of the ideas originated by P&H, many have already been adopted by the excavator industry. Many others will be. For instance, on the new P&H Pacemakers are a lot of "new fangled ideas" which speed up your digging and reduce your cost. Among them is all-welded construction of alloy steels. Have you read the new booklet "What Every Excavator Owner Ought to Know?" If not, write for your copy today. Address the Harnischfeger Corporation 4419 West National Avenue, Milwaukee, Wisconsin.

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ranging from 3/8 to 5 cu. yds. capacity with 7 attachment combinations.
Gas, Diesel or electric power.
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EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

Typical Road-Mix Job in Arkansas

(Continued from page 5)

The cured material was then spread by the blades to a string line and rolled with a 5-ton Austin Pup roller. The best results were secured by rolling the edge longitudinally first and leaving the center to be compacted by traffic for 3 to 5 days before rolling. The novel feature of this particular job was the planing of the surface to remove longitudinal ridges and knobs. Picking a hot day and the warmest part of the day, about 2 p. m., the blade of one of the patrols was set close to the surface and the machine run over the road, cutting off all the high spots. This was a most successful operation. In fact the work was so successful that a section of the work that had been completed for over a month and which had not been as smooth as was desired was treated to this very same planing with unusual results. While the appearance of the road immediately after the planing was anything but hopeful it soon resumed its uniform appearance under the annealing action of traffic. The only difficulty experienced with the planing operation was the occasional presence of oversize aggregate in the surface. When the blade hit such a piece of aggregate it tended to plow a hole or groove in the surface. The grader operator, E. B. Hart, watched this and in fact much of the success of the planing was due to his personal interest and attention to the action of the road surface under the blade.

The edges of the road-mix surface were trimmed with hand shovels to a string line, leaving a very neat job.

The road surface was sealed in the fall of 1937, using MC-2 asphalt at the rate of 0.20 gallon per square yard and was covered with 15 pounds per square yard of aggregate, 95 per cent of which was retained on a ⅜-inch screen. This produced a road surface of smooth-riding qualities, non-skid in character, pleasing in appearance and with reasonable maintenance costs.

Throughout Arkansas the test for the curing is not the eye or the "feel" of the material, but a novel piece of apparatus developed by the State Highway Department and very simple in form, which was described in an article on page 15 of our March, 1938, issue. Through the use of this still the actual amount of solvent in the mix at any time can be quickly determined in the field. When the solvent reaches a figure of less than 8 per cent it is permissible to spread and consider the surface material cured.

Personnel

The contract for the completion of the WPA projects centering at Marianna, Ark., was awarded to A. C. Kennedy of Little Rock, Ark. Adolphus Horton was Superintendent on base for the contractor and Joe Rowland was Superintendent on the surfacing and mixing operations. W. F. Deaderick was Resident Engineer for the State Highway Department. The projects were WPMH 191A and 192A of 5.6 miles, awarded for a bid of $76,513.58, and WPH 191B of 1.1 mile awarded for $13,398.97.

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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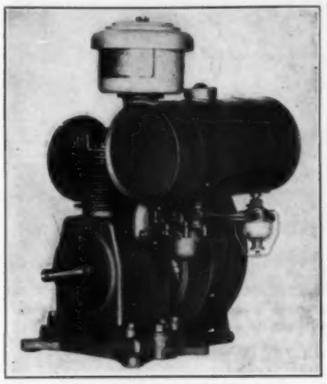

The New Lauson 1-Hp 4-Cycle Air-Cooled Engine

New Small Engines

Three new engines of ½, ¾ and 1 hp, embodying the latest developments in air-cooled engine design, have recently been announced by The Lauson Co., 55 Michigan St., New Holstein, Wis.

The 1-hp engine is light in weight, has advanced cooling and ball bearings, and is a 4-cycle gasoline unit. The ½ and ¾-hp models have completely dust-sealed magnetos, a screen in the fly-wheel housing and oil-bath air cleaners.

Complete information on these new engines may be secured by those interested direct from the manufacturer.

A New Car Unloader

The new Model BU-18 conveyor in a horizontal style only, recently announced by the Atlas Conveyor Co., Clintonville, Wis., is designed for use by contractors for handling crushed stone, sand, gravel and similar materials at the rate of 50 to 70 yards an hour, according to the manufacturer.

The unit's design permits its being laid across railroad tracks for car unloading without the necessity of digging into the ballast to secure a base for the machine. The conveyor is of simple design, with an 18-inch belt, and is powered by a geared-head 3-hp 60-cycle 3-phase 220-440-volt ac electric motor, or can be equipped with a 5-hp gasoline engine if desired.

The unit is 13 feet 9 inches long, 28 inches high, without the power unit, and has an overall width of 33 inches. The trough width is 11 to 15½ inches and the depth above the rail, 3½ inches.

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Power Multiplied at the Blade—*is the Important and Exclusive Advantage* Controlled Traction Gives the Owner of a "99" Motor Grader

● Power that side-thrust would ordinarily waste, is put to work. That is why the "99" can take DEEPER plow cuts, move LARGER windrows FARTHER, scarify HARDER material, and plow through frozen or caked snow easily . . . The unusual task or difficult ground conditions present no problem!

Sketch at right illustrates how frame can be offset either way to control traction and neutralize power-consuming side draft. By steering the front and rear wheels, wheels can be positioned anywhere within the areas marked "Selective Traction Range"—to distribute driving power *over entire blade,* from toe to heel.

Whether the "99" works in blow sand or mud, down in the ditch or up on the bank—on sharp elevated winding roads or narrow mountain trails, performance records prove it to be an exceptionally fine investment. Write us for full details.

DRIVES & STEERS All 4 Wheels

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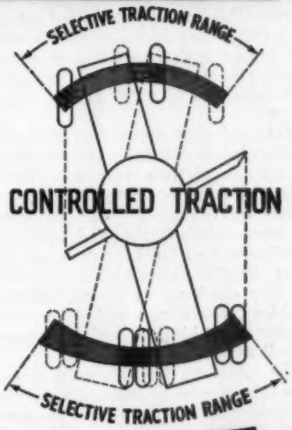

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☐ Trail Cars

99MG814

Name
Address
City State

WIRE ROPE SERVICE RECORD

Equipment Operated by .....
In What Service .....
Equipment Description of .....
Condition of Sheaves .....
Rope Diameter ..... Construction .....
.....
Grade ..... Lay .....
Record of ..... Rope
Date On ..... Date Off .....
Work Accomplished .....
.....
Lubricated (Date) .....
Remarks .....
.....
Record of ..... Rope
Date On ..... Date Off .....
Work Accomplished .....
.....
Lubricated (Date) .....
Remarks .....
.....

Suggested Form for Keeping a Record of Wire Rope

Rope Service Records Help to Cut Job Costs

There was a time when wire rope was universally regarded as a minor item of equipment, due to the fact that the cost of a few feet of wire rope is so small in comparison with the cost of a power shovel or other piece of major equipment, and also because wire rope was pretty much the same, a good staple product and who made it was of little importance.

Within the past dozen years or so, preformed wire rope has been developed and the preforming process, leaving the completed rope relaxed, limber and with more balanced strand tension, has resulted in a rope generally considered superior for many types of applications.

Operators have become much more conscious of the frequency of machine shut-downs, for machinery shut-downs on the job are extremely costly. The contractor with a big excavation job on hand painstakingly routes and times his trucks to keep the power shovel or dragline constantly at work. And as nearly as possible, he spaces his trucks so that they receive quick attention from the shovel. This carefully arranged schedule is completely deranged when a wire line breaks and the shovel is down. Trucks pile up, with their drivers idle, all for the want of a few dollars' worth of rope.

More and more contractors are learning the wisdom of keeping accurate service records of their wire rope lines. Only with such records can they know exactly which rope, not only the make but more especially the grade and construction, is best fitted for each particular application. Only with such records can they check up on the efficiency of machine operators and determine whether or not his lines are being abused as well as used.

The contractor now knows that wire rope is an extremely important piece of equipment and that on it there frequently depends the production of a costly machine and expensive man power. Many contractors are using various systems for keeping a record of their wire rope service. In this, as in everything else, the secret of success lies in the simplicity with which such records are demanded of the machine operator or foreman. One contractor has developed a very simple but very effective record form printed on a card which is tacked up in the machine cab. This service record card, shown in the accompanying illustration, is capable of keeping track of the service of two ropes. When filled, these cards are turned into headquarters where the information is transferred to a permanent "Service Report Ledger." The gradual accumulation of records in this ledger gives the contractor an opportunity to specify the best and most suitable rope for a particular application, correct time leaks here and there, encourage more frequent inspection of both ropes and sheaves, and cut costs all along the line.

Working in Unison, Shovels Dig Ditches

On its drainage contract for the American Viscose Corp. at Front Royal, Va., the Luck Construction Corp. of Richmond, Va., was faced with the problem of excavating drainage ditches for pipe of all sizes, ranging from 4 to 72 inches. As some ditches were to contain three lines of pipe, a cut of 20 feet in width and an extreme depth of 27 feet was required. The total excavation for these ditches was about 150,000 yards.

All of this work was done with three Lorain 40's, using the various attachments such as hoes, shovels, draglines and clamshells. These units had to work in unison, one being dependent on the other for a full day's work. The ditch shown in the illustration was 20 feet wide and from 20 to 23 feet in depth. The shovel removed 6 to 7 feet of the top and this dirt was hauled to the dump. Then the hoe removed the remainder of the material, a maximum of 16 feet, casting the dirt on top of the bank to the dragline which took it and piled it back from the ditch.

Lorains Team Up to Excavate Drainage Ditches on a Half-Million Dollar Contract in Virginia

The contractor reports one interesting problem when the bottom 5 feet of a ditch proved to be shale so hard that the hoe could not dig it at that depth. The shovel was put to work at the bottom of the ditch and it dug the shale, kicking it ahead so that the hoe could take it out and deposit it on the bank for the dragline.

New England Distributor For Universal Crusher Co.

The Hedge & Mattheis Co., Boston, Mass., has been appointed New England distributor for Universal crushing, screening and loading equipment and the new Chip-Top Spreaderoller made by the Universal Crusher Co., Cedar Rapids, Iowa. The Universal line will be sold and serviced from Hedge & Mattheis branches at Boston, Springfield and Worcester, Mass.; Providence, R. I.; Portland, Maine; New Haven and Hartfort, Conn.; and Concord, N. H.

CHECK these advantages of Franklin ~~AIRCOOLED~~ INDUSTRIAL POWER UNITS

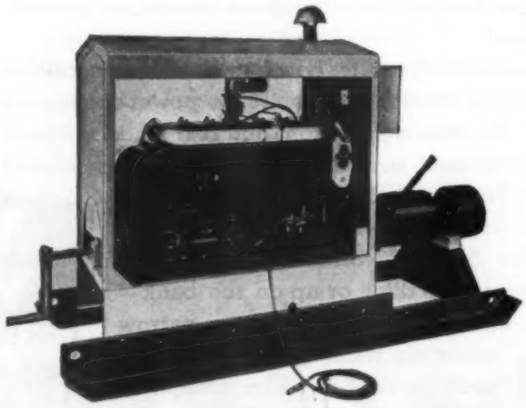
against your present power costs. They give you *some* reasons for the construction industry's rapidly growing appreciation of the inherent economy of air cooled engines for industrial use.

LOW OPERATING COST

Greater *positive* fuel economy is assured because of the air cooled engine's highly efficient cooling system which enables it to quickly develop more efficient and constant operating temperatures. Accurate field records show gasoline savings up to 30% over water-cooled types of power.

LOW MAINTENANCE COST

In an air cooled engine, the expense of maintaining radiator, water pump, hose, fan belt and other plumbing fixtures is entirely eliminated. An air cooled engine is easily serviced by any good mechanic familiar with ordinary water cooled engine practice. Its extremely simple construction and easy-access design makes for economical maintenance. For example, its individual cylinder construction alone effects radical savings in time, labor and expense.



● An air cooled engine is an all-weather engine because it will not freeze in zero weather, boil or overheat in extreme heat or high altitudes, —and *requires no anti-freeze*. Frozen and cracked engine blocks are a thing of the past, —constant draining and refilling is no longer required,—nor is it necessary to locate your unit close to a water supply.

● An air cooled engine weighs less because it has no radiator, plumbing system or water. The use of aluminum alloy in cylinder heads and other mechanical parts adds to its lighter weight without any sacrifice of ruggedness. In trucks, especially, this saving in weight is important because it allows for greater pay load.

If your problem is one of power for road machinery, trucks, industrial equipment, agricultural machinery, saw mills, compressors, pumps or other industrial use,— *write for Bulletin No. 9E* and learn how you can cut *your* power costs.

AIR COOLED MOTORS CORPORATION
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Hydraulic Fill Used To Restore Levees

(*Continued from page 2*)

Material was placed in the fill to the approximate levee berm grade by the Dredge Omega with the use of pocket pipe without the aid of retaining dikes or bulkheads. For the remainder of the fill, earth retaining dikes were constructed near the toe of the land-side and river-side false berms with a spillway at one end to drain the water from the impounded area. Between the retaining dikes, the balance of the fill, aggregating approximately 8 feet in height, was pumped.

Each dredge was operated on a basis of three 8-hour shifts per day for five and one-half days per week. A total of 1,714 pumping hours was required, 349 hours by the Dredge Ockerson, and 1,365 hours by the Dredge Omega.

A 65-foot boom dragline with 2-cubic yard bucket was used in construction of the retaining dikes, except in areas which would not support the dragline, where dump trucks were used in conjunction with the dragline. The dragline was equipped with a 500-watt light plant for night operation. After completion of the hydraulic fill, final shaping of the levee section was accomplished with the dragline, a tractor bulldozer, and hand labor. In order to expedite removal of water from the material in the final lift or impounded area of the dredged fill, holes not to exceed 3 feet in depth were dug as sumps and the accumulated seepage removed with a 2-inch pump. In accordance with specifications, an allowance of 8 per cent of net fills was made for shrinkage on the undisturbed hydraulic fill. Correspondingly, an allowance of 25 per cent was made on fills required to be rehandled by the dragline.

Pritchard Landing Levee

A series of small crevasses or levee breaks occurred on Jan. 25 and 26, 1937, in the front-line or river-front levee of the Birds Point-New Madrid Floodway, opposite Wyatt, Mo., at Pritchard Landing, which is approximately 8 miles by river below Cairo, Ill. As a result of these crevasses, the restoration of 1,850 feet of levee was required, which was accomplished by the United States Engineer Department in a similar manner to that followed at Wolf Island and as described above, except for the following modifications.

The United States Engineer Department Dredge Omega was utilized alone to pump material from a borrow pit along the right bank of the Mississippi River, the dredged material being discharged between earth retaining dikes to form the levee section. The retaining dikes constructed by a dragline were parallel to the center line of the proposed levee and approximately 60 feet apart. The levee was restored to the same cross-section of the old levee having a 2-foot crown at Elev. 326.3 Mean Gulf Level, 1 on 3 river-side slope to natural ground surface, 1 on 3 land-side slope to Elev. 318.3, then a 40-foot width banquette having a 1 on 20 crown slope and 1 on 4 side slope to the natural ground surface. The net quantity of material required was 150,000 cubic yards.

In accomplishing the work, the Dredge Omega was required to pump through a maximum length of 3,500 feet of discharge pipe line and with a maximum lift of 35 feet.

New Catalog Issued on Portable Electric Tools

The complete 1938 line of Thor portable electric tools, including universal-type electric drills, drill stands, saws, hammers, grinders, nut setters, heat guns and electric tool accessories, is described in a new well-illustrated 48-page catalog recently issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.

In addition to complete descriptions and specifications of these tools, this catalog also contains considerable information on their various uses, with illustrations showing them in use on the job. Featured in the catalog are the Thor U14A series of 3/16 and ¼-inch drills, the U44 ½-inch drill and the U16A series of screw drivers.

Copies of this catalog may be secured by interested contractors and engineers direct from the manufacturer.

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- Finger-Tip Hoist Control (same as on $12,000 Shovels)
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Get our low prices on light 10-20 H. P. and intermediate 25 H. P. Screw Thrust Hoists. Send for Catalog H-37.

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. . . . thousands of Contractors know the quality . . . . and repeatedly buy from Blaw-Knox.
BLAW-KNOX DIVISION
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Farmers Bank Building Pittsburgh, Pa.

The New Jaeger Non-Tilt Mixer

A New Light-Weight Non-Tilt Trailer Mixer

The light-weight Handy non-tilt trailer mixer, claimed to have a capacity of 30 to 40 cubic yards a day, is the latest addition to the line of concrete and plaster mixers made by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. The high daily capacity of this small mixer is due to the measuring batch hopper which is of the same capacity as the drum and thus may be loaded while the previous batch is being mixed and discharged, eliminating waiting between batches.

The drum design is identical with that of the larger Jaeger mixers, employing a criss-cross remixing action. The buckets are large for fast discharge into forms or wheelbarrows. Chilled drum rollers operate on a ball-bearing shaft. The water tank is of the syphon type, of 7 gallons capacity, with a quick-setting dial. All controls are grouped on the side opposite the fully enclosed 2½-hp engine. Pneumatic tires, Timken bearings, spring shock absorbers and a disappearing towing pole provide for trailing the mixer behind a light car.

Recent Developments In Bituminous Curing

The method of curing concrete by the use of bituminous or other impervious membrane is now controlled exclusively by the Johnson-March Corp., 52 Vanderbilt Ave., New York City. Heretofore, this company marketed only the Hunt Process and Ritecure under license from the Barber Asphalt Corp., which sold Curcrete for the same purpose. Now, by arrangement with the Barber Asphalt Corp., Johnson-March's license includes all the rights under U. S. Patent No. 1,684,671. This patent, which has been under litigation, was recently validated by the U. S. Supreme Court.

In order to promote unrestricted and fully competitive bidding on this curing method, the Johnson-March Corp. offers to license anyone to use it, with any kind of asphalt cut-back or emulsion, upon payment of a moderate royalty, or, if contractors so elect, they can purchase Hunt Process, Ritecure or Curcrete, all products designed for this special process, at a price which includes the royalty for the use of the process.

Bituminous or impervious membrane curing consists of the spraying of a bituminous cut-back, emulsion or colorless compound on concrete immediately after it has been placed and finished. This compound forms a film which gives curing protection to the concrete, not only during the critical first day, but until the slab is fully hardened and put into use. The bituminous coating on highways, by darkening the surface, is claimed to kill the glare and also to eliminate the unsightly oil and carbon stains in the traffic lanes.

The results of extensive investigation of this method of curing are published in a booklet which may be secured by interested contractors and engineers direct from the Johnson-March Corp.

New Jersey Lights 56 Miles of Highway

Provision has been made by the New Jersey State Highway Department for lighting White Horse Pike, a heavy traffic artery across the State from Atlantic City to Camden, a distance of about 56 miles. A few sections of this Route 43 were already provided with illumination and the installation, completed in May, is the world's longest continuous stretch of highway lighting.

This project is part of the plan of E. Donald Sterner, State Highway Commissioner, to attempt to cut down the large number of night accidents on this highway during the summer months, and being of an experimental nature, includes various types of incandescent and sodium lighting units. The State Highway Department is bearing the major portion of the lighting cost and the luminaires were installed and will be maintained by the Atlantic City Electric Co. and the Public Service Electric & Gas Co. of New Jersey.

The new General Electric incandescent luminaires are being used on the major portion of the route with a few sodium-vapor units for test purposes. The new luminaire is so designed that a high percentage of the generated light is directed to the pavement in an elongated oval pattern and the eyes of drivers are shielded from glare.

The White Horse Pike is one of New Jersey's busiest highways, some parts of it carrying from 7,000 to 10,000 cars a day. Lighting and division of these highways with safety islands are the principal safety measures being undertaken at present by the State Highway Department.

New Fitting Provides On-the-Road Greasing

A new type of Alemite hydraulic reservoir cup for on-the-road replenishment of grease in heavy-duty motor or truck bearings has been announced by the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill. This new fitting provides an automatic, constant and controlled flow of grease or semi-fluid oil to king pins, spring shackles and other bearings subject to heavy wear.

It frequently happens in heavy-duty long-haul service that some bearings become dangerously dry while others remain adequately lubricated. This new Alemite fitting provides that such bearings may be properly lubricated without lost time for taking the truck out of service. The operator follows the same procedure in applying lubricant to a bearing equipped with the new reservoir cup as he would any other bearing equipped with a high-pressure fitting. The cup, which stores grease and supplies it to the bearing as needed, is filled through an Alemite fitting on the side. An automatic patented shut-off valve protects the reservoir from damage by high pressures, even those up to 10,000 pounds per square inch.

The lubricant from the gun first flows into the cup's reservoir where it is stored under the pressure of a coil spring pressing on a piston. When the reservoir is filled, its shut-off valve closes automatically and the remainder of the lubricant being applied flows directly to the bearing, flushing it clean of old grease. Removal of the gun seals the fitting against moisture and grit.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
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REX SPEED PRIME PUMPS

The only contractor's pumps that bring you the advantages of:
1. Rex Automatic Prime Control Valve
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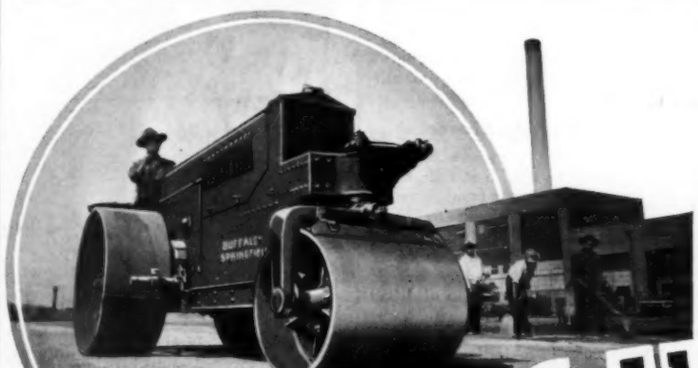
4. The Rex Big Recirculation Tank

That's why they pump at lower cost per gallon—through more years of trouble-free service. Send for details today. Ask for the Speed Prime Pump Catalog. Address the Chain Belt Company, 1606 West Bruce Street, Milwaukee, Wisconsin.

REX SPEED PRIME PUMPS



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STRENGTH and DURABILITY plus ECONOMY
Made in 12 Models, from 2 to 21 TONS—
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Full details will be sent upon request
THE BUFFALO-SPRINGFIELD ROLLER CO
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Be sure it's the
GIANTGRIP T STRAIGHTEDGE
Either Steel or Aluminum
For Checking Concrete Surface
Two useable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.
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TWELVE different types . . . Five Tons to Two Hundred Tons capacity . . . Four to Sixteen Wheels . . . Two to Eight Axles . . . Designed to Avoid Highway Damage . . . Simplify your Heavy Hauling Problems . . . Write . . .
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SUBSIDIARY OF LA CROSSE BOILER COMPANY
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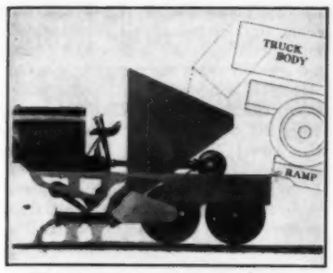

The New Universal Spreaderoller

New Material Spreader

A road-resurfacing material spreader of new design for seal coating and spreading all types of stabilized-road materials has recently been announced by the Universal Crusher Co., Cedar Rapids, Iowa. This new Universal Spreaderoller segregates the aggregates into coarse material, medium-sized material, and fines, depositing them in that order on a freshly sprayed bituminous surface and rolling them smooth, all in one operation.

The Spreaderoller consists of a chassis mounted on three rollers, the third of which is at the back of the machine directly behind the inside edges of the two forward rollers. The unit is controlled from the operator's platform and the two forward rollers are driven and the machine is steered by braking either the right or left driven roller. Mounted on the chassis is an industrial power unit and a hopper with a mechanical distributor which feeds the aggregate to a shaker screen. A portable ramp towed by the Spreaderoller permits trucks to back up to the unit and dump their loads into the hopper. The machine need be stopped only long enough to charge the hopper. Road widths up to 10 feet can be spread and rolled at one time, permitting the other half of the road to be used by traffic.

The manufacturer claims that the Spreaderoller meets the requirements for a 10-ton roller and can be used for that purpose, as well as for spreading base-course materials and all types of surfacing materials for stabilized roads. Approximately ¾ to 1 mile of highway 10 feet wide can be surfaced an hour, spreading from 15 to 25 pounds or more of material per square yard.

Dustless Roads in Finland

Calcium chloride is being used to an increasing extent to lay the dust on roads in Finland, according to a recent report from the U. S. Bureau of Foreign and Domestic Commerce. In 1934 60 kilometers of road was treated in this manner, in 1935 200 kilometers, in 1936 500 kilometers, and in 1937 2,800 kilometers. During 1938 it is planned to treat 3,300 kilometers. About 7,500 metric tons of calcium chloride will be imported, the estimated cost of treatment varying from $38 to $110 a kilometer, depending on the width of the road.

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Asphalt Plants
All styles and sizes
for
HOT or COLD Mix
Heavy-Duty Mixers
45 Years' Experience
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THE F. D. CUMMER & SON CO.
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Two-Speed Axles Feature New Trucks

Designed for a wider range of operating requirements, 157 and 134-inch wheelbase Ford V-8 trucks are now available with two-speed axles, according to a recent announcement by the Ford Motor Co. of Dearborn, Mich.

This new rear axle has virtually the same basic features of design as the conventional Ford truck axle. The pinion shaft is straddle-mounted with two large tapered roller bearings in front of the pinion and a straight roller bearing behind it. The differential case is supported on large tapered roller bearings. One feature is that in the reduction only four additional moving parts are in operation, a simple planetary system of gearing being used to obtain the reduction.

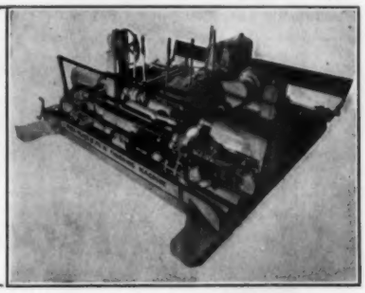
The control for the two-speed axle consists of a lever mounted on the cab at the left of the driver's seat. With the control lever in the forward position, the high axle ratio is in use, at which time the axle operates as a conventional one-speed axle. To shift the axle into low gear ratio, the clutch is depressed and the lever moved back, which causes the shifter fork in the rear axle to change the position of the sliding clutch.

The two-speed axle has been designed with a novel method of providing forced lubrication to the bearings. Differential and planetary gears are constantly immersed in oil as they rotate and lubricant is also supplied to the left-hand differential side bearing by the rotation of the assembly.

Duluth Dealer Moves

The Lange Tractor & Equipment Co., distributor for Caterpillar tractors and a complete line of road-building and maintenance equipment, has moved from its former location on Lake Avenue South to 210-212 E. Superior St., Duluth, Minn.

"WHEN IN CANADA"
When you visit Canada drive over their best concrete road between Hamilton and Toronto—laid with "FLEX-PLANE" Finishing Machines. When it comes to joints, nothing equals "FLEX-PLANE" dummy joints.
FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO



CUT YOUR
DRILL REPAIR COSTS

DO YOU know that Cleveland Universal Drill Rigs and hand-held drills cost you less for repairs than other makes, and also give you more footage per shift? This can easily be proven by keeping a record of repairs used and footage drilled per shift by each machine you are operating.

Many large users of rock drills carry drilling costs to the third decimal place, providing thus indisputable figures on which to base future drill purchases. If you follow their lead, you can cut your drilling costs by knowing the drills which are giving you the most footage at the least expense.

We have prepared for your use drill repair cost sheets which we will gladly supply to you without charge, and without obligation on your part. How many shall we send?

SINKERS DRIFTERS STOPERS WAGON DRILLS PAVING BREAKERS
PNEUMATIC DIGGERS TAMPERS ACCESSORIES
THE CLEVELAND ROCK DRILL COMPANY
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Cable Address: ROCKDRILL
LEADERS IN DRILLING EQUIPMENT

Good Low-Cost Roads

This is the title of a new 34-page booklet published by the Tractor Division of the Allis-Chalmers Mfg. Co. to promote a better understanding of road building, particularly among tax payers. The chief purpose of the booklet is to give a general idea of the various types of good low-cost roads, the materials and equipment used in their construction, and their approximate costs.

The advantages of good roads in rural communities are outlined and illustrated, data given on rural road mileages, both improved and unimproved, standards for country road design are given, the importance of proper maintenance is stressed and many other road facts are included.

Copies of this booklet "Good Low-Cost Roads" may be secured by interested contractors, state and county highway engineers and commissioners and others interested in good roads by writing direct to the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis., and mentioning this magazine.

Cleaning Trucks and Engines

Of particular interest to state highway department garages and county highway departments as well as to contractors operating their own shops for fleet maintenance and truck motor repairs is a new 36-page booklet outlining the many necessary cleaning operations for such work. This booklet, issued by Oakite Products, Inc., 14C Thames St., New York City, contains detailed instructions on typical maintenance operations, such as cleaning cooling systems, washing motor interiors and exteriors, steam or tank cleaning engine repair parts, washing auto bodies and chassis and general shop maintenance cleaning.

Helpful data on paint-stripping is also given, the high spot of which is that either hot or cold solutions can be used with equal effectiveness in doing this work.

Copies of this booklet may be secured by interested contractors and state and county highway engineers direct from Oakite Products by mentioning this magazine.

Road Contractors find that
STANDARD AUTOMOTIVE ENGINEERING
keeps equipment on the job
You'd gladly pay real money for a full season of trouble-free operation from your shovels, tractors, trucks or other Diesel or gasoline-powered equipment.
Standard Automotive Engineers cannot guarantee a completely trouble-free season but they can do a number of things that will reduce equipment shut-downs and delays occasioned by engine maintenance and repairs on the job. And this service does not cost you a cent.
Automotive Engineering Service is available to all construction equipment operators in Standard Oil (Indiana) territory. The Standard Automotive Engineer is a technically trained man with years of practical experience in automotive work. He has modern instruments for locating engine trouble, plus a knowledge of fuels and lubricants that enable him to specify the exact product for every type of service.
Right now, some bearing or gear train in a shovel may be giving you trouble. Tractors or bulldozers may be out of service all too frequently for repairs of one kind or another. Let a Standard Automotive Engineer in on the problem. It's almost certain that he can help you. Call the nearest Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois. You'll get prompt and interested response.
Copr. 1938, Standard Oil Co.
STANDARD OIL COMPANY (INDIANA)
AUTOMOTIVE ENGINEERING SERVICE
LOWERS MILEAGE COSTS

Tunnel Job Tests Modern Equipment

(*Continued from page 18*)

procedure set up by the District was exercised during the post-strike period, for it was realized that to maintain the enviable record already established in San Jacinto would not be easy with new crews. During the 2½ years of pre-strike District control, the frequency had steadily been reduced, until in July, just previous to the strike, it stood at 83, as compared to the average frequency of 151 for comparable heavy construction in the state. Frequencies are figured on the basis of lost-time accidents per million man-hours worked.

The rate was more than maintained; it was lowered. For September, the first complete month after the strike, it was 58, and the average for the last four months of the year was only 80.

Value of Equipment

Aqueduct engineers have long realized the importance of modern equipment in constructing this huge project. Forced by residence restrictions to employ men previously inexperienced in this type of work, they were from the first frankly dependent on the simplicity and efficiency of machines to see them through.

"You can't build 108 miles of tunnel through that desert with green men," was the opinion of many qualified critics at the beginning of the project. The fact that these green men were trained in the use of machines most of them had never even seen before, and that they have done the greater part of the job quickly and safely, is largely because of machines safe and easy to operate, machines that will almost run themselves.

The results at San Jacinto are hardly more remarkable than any other phase of the huge project. Their significance lies in the fact that they present a clear-cut illustration of the part played by modern equipment.

Proceedings of 1937 Meeting Of Highway Research Board

The Proceedings of the Seventeenth Annual Meeting of the Highway Research Board, containing twelve more technical articles than last year's edition, is just off the press. The topics covered include financial administration, highway transportation economics, design, materials and construction, maintenance of highways, traffic and safety, and soils investigation.

Copies of this volume may be secured from the Highway Research Board, 2101 Constitution Ave., Washington, D. C. Price: $2.25. There are still available a few copies of the Index to Volume 1-12 which may be secured with supplements for Volumes 13-17 for $1.95.

New Barber Asphalt Engineer

The Barber Asphalt Corp., Philadelphia, Penna., has announced the appointment of Howard V. Smith of El Dorado, Kans., as Chief Chemical Engineer. For the past 11 years Mr. Smith has been assistant superintendent of the El Dorado refinery of the Skelly Oil Co.

J. Strother Miller Jr., formerly director of the technical department, has been advanced to the position of Technical Adviser for the Barber Asphalt Corp.

South Bend

BITUMINOUS MATERIAL DISTRIBUTOR

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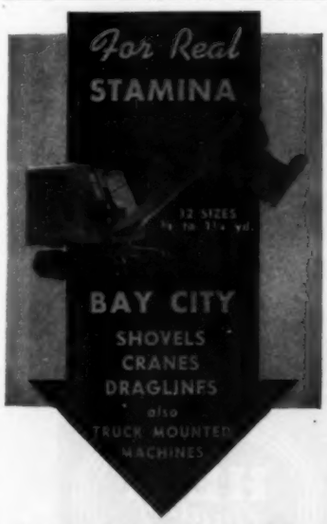
1908—Thirty Years' Experience—1938

MUNICIPAL SUPPLY COMPANY
SOUTH BEND, INDIANA



Quality of workmanship, design accessibility, speed, working range and safe load capacity are built-in features that assure BAY CITY owners more yardage at lower cost. For economical, efficient operation investigate BAY CITY Machines.
Write for details

BAY CITY SHOVELS, INC.
Cable address "DREDGE"
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FORD PRESENTS CAB-OVER-ENGINE DESIGN *to the Low-priced Truck Field*

FOR YEARS truck owners and operators have asked for a low-priced cab-over-engine unit. Ford now answers this demand. The Ford V-8 Cab-Over-Engine is here.

The Ford V-8 Cab-Over-Engine is of advanced design, yet it utilizes time-and-service-proved features of Ford construction. Every detail has been planned to take the greatest advantage of a short wheelbase to provide increased payload space.

But most important of all features to be found in these new units is Ford Economy. Owners and operators everywhere report that the Ford Truck does more work, in less time, at lower cost. The reason—because Ford has found the way to make extra cylinders mean extra economy as well as finer performance.

Examine the Ford V-8 Cab-Over-Engine Truck at your Ford dealer's today. Then arrange for an "on-the-job" test with your own driver and your own loads over your own routes. No cost.

FEATURES OF THE FORD V-8 CAB-OVER-ENGINE TRUCK

- ★ 101-inch and 134-inch wheelbases.
- ★ 85-horsepower eight-cylinder engine.
- ★ Advanced design. Service-proved top-quality Ford engineering features.
- ★ Easy entrance to cab, wide door hinged at front.
- ★ Comfortable riding.
- ★ Easy steering.
- ★ Easy accessibility to engine.
- ★ Designed for convenient servicing.
- ★ Greater maneuverability in traffic.
- ★ Greatly increased payload space.
- ★ Increased view of road.
- ★ Decreased turning radius.
- ★ Time-and-money-saving Ford Engine and Parts Exchange Plan.

FORD V-8 TRUCKS

MORE WORK IN LESS TIME AT LOWER COST ACCORDING TO OWNERS' RECORDS

Heavy Grading Job For Oregon Highway

(*Continued from page 19*)

that way and would have to snake them together. But Houck, not being an old logger, did them his own way, with excellent results. With a large amount of the stuff out of the way after the first burning, the area was opened up enough so that a bulldozer could follow and make some semblance of a roadway. On the rear of the bulldozer, a jinny was rigged, and with a long steel cable the remains of the large trees together with the smaller ones and stumps were yarded down the steep hillsides and piled together at the bottom closely enough so that the burning could be completed. The smoke in the ravine was terrific, but the men worked right through it that the job might go on. Presently the lower end of the ravine was clear and other operations started.

Grading

The first grading equipment in was a Caterpillar RD-8 drawing a LeTourneau 12-yard Carryall. After that got started, others were brought in as fast as available dirt areas were opened up for them to work on. Houck is a believer in Carryalls, singly or in tandem, and works them wherever possible. There was some rock, however, to be excavated by shovels loading to trucks.

The next piece of heavy equipment to get in, early in July, was a Thew-Lorain 55 shovel equipped with a 1-yard dipper. This was used initially on channel change work.

Two 8-hour shifts, with a light shift at night, were worked through the clearing and initial grading stage, with an average of about 70 men. Before them lay an estimated total excavation of 180,000 cubic yards and this, as nearly as could be determined, consisted of 66,000 unclassified, 99,000 solid rock and 15,000 common. At the south end of the section, immediately following the Necarney Creek bridge (C&EM April page 2) there was one cut which alone contained 50,000 cubic yards, with a slope on one side having a vertical height of 100 feet. The material in this cut, a large part of which was rock, came in handy at the foot of the hill in making a large parking area 120 feet wide by 600 feet long. At this point, the highway is about a half a mile from Short Sand Beach in Smugglers Cove, a hidden cove heretofore approachable only by water or by a long arduous trail through the forest. A good trail will eventually be built to this beach from the parking area.

At the north end of the Houck section there is a hill containing a total of 93,000 cubic yards, of which 33,000 came in his portion. Of the remaining 60,000, most of the rock will be left for the present, the highway department using it as a quarry in connection with maintenance work.

Progress

Going on the job early in July, 1937, less than two months after the first axes bit into the forest giants, one was impressed with what had been accomplished. At the upper end, some clearing was still in progress, but the fires had already died down on over half the area and dirt was beginning to move in earnest. Houck is not only a pusher, but he is versatile. If any part of the work shows the least sign of lagging because of method, that method is changed, and "right now". He had a number of other jobs under way, and owns an aggregation of heavy equipment of all kinds as large as that of any other contractor in the state. He is here and there and everywhere over these jobs. It is said that two new automobiles a year are necessary to keep him going. The author can believe this for in three days' time spent on this job and another of his near McMinnville, Ore., he never once saw the man, who was always just coming to or just gone from any particular spot.

Personnel

The Oregon Coast Highway is a state project with Federal Aid. The work comes under the direction of R. H. Baldock, State Highway Engineer for the Oregon State Highway Commission. J. H. Scott was the Resident Engineer, with headquarters at Nehalem, Ore.

1938 Road Rollers

One of the features of the improved line of road rollers for the 1938 construction season, made by the Huber Mfg. Co., Marion, Ohio, is the Huber Tru-Plane which is available for the 7-ton and larger models. This Tru-Plane attachment levels out high spots for immediate bonding, straightens out wrinkles and reduces rolling time as well as cross or diagonal rolling, according to the manufacturer. This roll, which is located just ahead of the rear rolls to secure maximum compression, travels straight up and down. A touch of a lever drops this hydraulically operated Tru-Plane into action whenever desired.

These Huber rollers, which are made in 5, 6, 7, 8, 10 and 12-ton sizes, are available with gasoline or diesel power. The 5, 6, 7 and 8-ton models have four speeds forward and four reverse and the 10 and 12-ton models have three speeds each way. Dual steering allows a choice between a quick power steer and a hand steer which are instantly interchangeable. The frame is substantial and rigid and roller bearings are used throughout in the front and rear rolls, front head and all transmission points. All models are equipped with a low-pressure hydraulic system for operating the scarifier, leveling blade or Tru-Plane attachments.

Two catalogs, one describing and illustrating the 5, 6, 7 and 8-ton models and the other on the 10 and 12-ton models, may be secured by interested contractors and state and county engineers direct from the manufacturer.

No "Dead-Head" Metal Rides in

WILLIAMS *Buckets*

● Williams Buckets don't rely on sheer mass and dead weight for digging power and stamina. Williams welded construction cuts down weight without sacrifice of power and durability.

Williams power mechanisms give the bucket tremendous digging ability. They bite quickly and deeply to get full capacity loads —they work faster—get the job done quicker because you are moving dirt —not inert metal.

THE WELLMAN ENGINEERING COMPANY
7912 Central Avenue Cleveland, Ohio

The Williams line includes Power-Arm, Multiple Rope, Power Wheel, Single Line Hook-On, and Dragline Buckets.

Distributors located in all parts of the country are competent to render valuable field service.

Tell us the condition, and we'll send you FREE, a special bulletin describing the specific Williams Bucket best fitted to the job.

built by WELLMAN

ROGERS HEAVY DUTY Investment Trailers

ONE STANDARD OF PROVEN DESIGN

EXPERIENCE *built it*
PERFORMANCE *sold it*

● The "bugs" inevitably encountered in the development of any product were long since eliminated from Rogers Trailers.

The uniformity of design which prevails throughout the entire line, stands as evidence of this fact.

Twenty-five years of specialized experience and the greatest acceptance of any heavy duty trailer gives assurance of unequalled value in a Rogers Trailer. Get the Rogers Catalog.

ROGERS BROTHERS CORPORATION
108 Orchard Street, Albion Penna.

HEIL DIG-N-CARRY

The enthusiastic acceptance of Heil Dig-N-Carry Scrapers is based on the obvious *time saving* and *money making* features built into this remarkable series of dirt movers. Your nearest Heil distributor will welcome an opportunity to show you how *you can save time and money* with dependable Heil Dig-N-Carry Scrapers. Address your inquiry to:

MILWAUKEE WISCONSIN THE HEIL CO. HILLSIDE, NEW JERSEY

HEIL Quality PRODUCTS

HOISTS BODIES TANKS
ROAD SCRAPERS SNOW PLOWS
BOTTLE WASHERS DEHYDRATORS
OIL BURNERS WATER SYSTEMS

Long Culvert Carries Highway In Pa. City

(*Continued from page* 15)

of 1¼ x 8-inch ship-lap sheathing and 2 x 6 studs spaced 20 inches apart. The walks were 4 x 6 hardwood placed top and bottom. No ties were used, only 2 x 6 "kickers," and the outside forms were braced to the face of the excavation all along the line. Posts of 4 x 6's with 4 x 6 caps were used along the center of the forms spaced 4 feet. The forms were made in four sections, two sides and two pieces for the top in 16-foot lengths. Thus when it came time to collapse the forms it was necessary only to knock out the wedges under the bottom of the posts and the forms were "pulled."

Concreting

All the concrete for the box culvert was placed by a No. 180 Pumpcrete. The same machine was also used for pouring three culverts in a group out on the other end of the contract. It was cheaper to set up the Pumpcrete unit and pump first in one direction and then in the opposite to the three culverts than it was to haul a 2-bag mixer to the three locations, stockpile the aggregates at three places and handle the concrete by buggies with the attendant losses in materials and time.

The Pumpcrete was set in a pit beneath the delivery chute of a Koehring 27-E paver which was cribbed up 3½ feet. This combination brought the pipe of the Pumpcrete at sidewalk elevation. Seven-inch delivery pipe was used with the usual convenient clamps for making joints. The batches for the concrete were made up and hauled to the skip of the paver by the Builders Supply Co. of McKeesport. The maximum delivery of concrete in an 8-hour shift was 120 yards. The job was run with a 12-hour day of two 6-hour shifts.

The concreting crew consisted of the skip man to dump the dry batches into the paver skip, two men emptying the bags of cement into the skip, the mixer operator, one man on the Pumpcrete and a helper who ran errands and washed out the machine at the end of runs. The maximum distance, uncompensated, that concrete was pumped was 650 feet. It was placed with 6-foot semicircular chutes to the two sides. The discharge pipe from the Pumpcrete was laid down the center of the forms and therefore it was easy to deliver the concrete first to one side and then to the other. The sides were filled alternately to half height to bring even pressure on the braces. Two lifts were used on the sides and then the top was poured.

The placing crew for concrete consisted of six puddlers who also handled the 1 to 10-foot lengths of pipe and two men with Vibro concrete vibrators operated by electricity. The line had only three angles, one 90 near the machine and two 45's to carry the pipe out to the forms from the main line which was laid on the sidewalk where it would not interfere with form construction. The pipe was washed out in every instance as soon as it was taken off the line or when a pour was completed.

The box was cured on top by covering with burlap and sprinkling for seven days. Outside forms were stripped in 24 hours and inside forms in 96 hours, and moved ahead by man power. They were merely skidded ahead on the plates. There was a total of 3,024 cubic yards of concrete in the 1,400-foot culvert.

Personnel

The complete contract for the construction of the pavement as well as the storm sewer described in this article was completed by Freeland, Inc. of Pittsburgh, Pa., under the general supervision of M. J. McMahon, Vice President, with Harry Quail as Superintendent, assisted by D. L. Carson. For the State Highway Department, the work was under the supervision of Joseph E. Burke, District Engineer.

Have you a lubrication problem? Write the Editor.

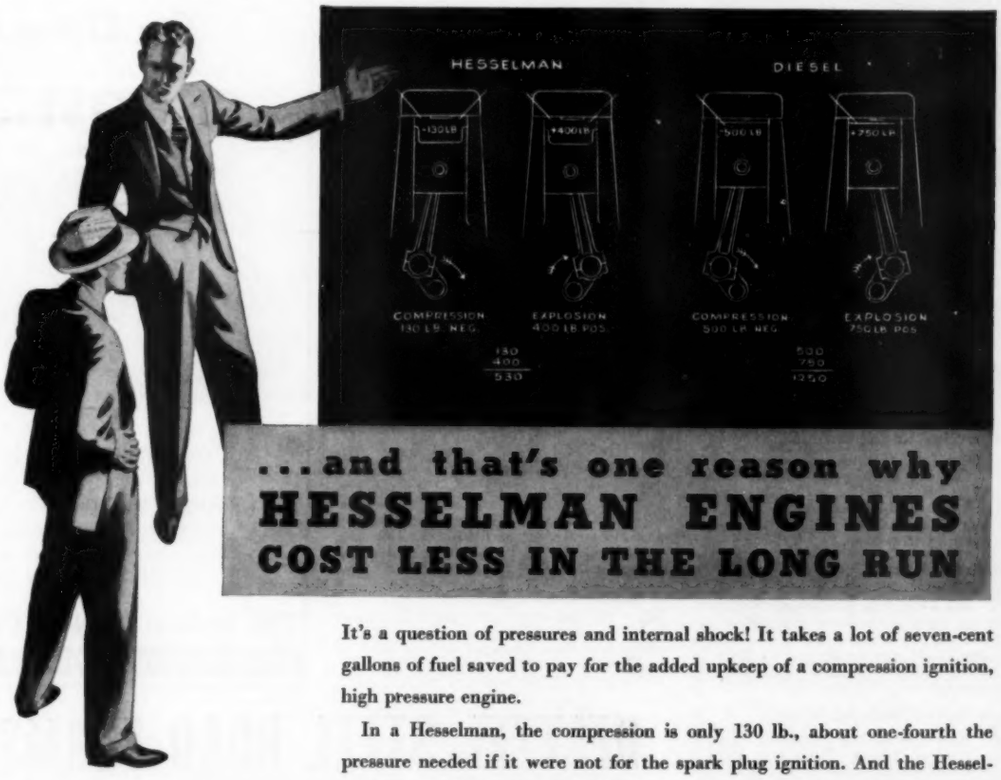
STERLING No. 6 CONCRETE CART

Sterling No. 6 Cart

6 cu. ft. capacity
42" dia. wheels
12 gauge tray
Malleable Trunnions
With Plain or Roller Bearings

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.



...and that's one reason why
HESSELMAN ENGINES
COST LESS IN THE LONG RUN

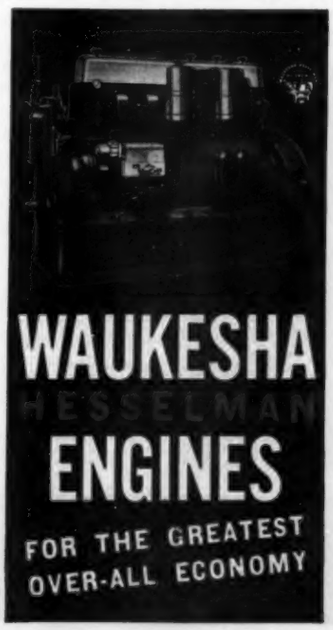
It's a question of pressures and internal shock! It takes a lot of seven-cent gallons of fuel saved to pay for the added upkeep of a compression ignition, high pressure engine.

In a Hesselman, the compression is only 130 lb., about one-fourth the pressure needed if it were not for the spark plug ignition. And the Hesselman's explosion pressure of 400 lb. is *not even as high as the compression pressure in a Diesel.*

In a Diesel the total instantaneous reversal stress at top dead center—the torsional whip crack—in the crankshaft is as high as 1250 lb. . . . *more than twice that of the Hesselman's* 530 *lb.* Just picture the timing gears as the lash of such a whip.

Because this high reversal stress comes with great suddenness, Diesel crankshafts must be much heavier to withstand torsional fatigue; bearings must be larger to withstand the pressures; gears must be stronger to prevent breakage. Besides, the heavy flywheels that smooth out these torque reversals impose further torsional strain upon the crankshaft, add to inertia, and ruin acceleration.

Hesselman Engines have none of the Diesel's high pressure disadvantages. They use positively timed electric ignition; they start in any weather promptly and easily; they cost little to maintain; they burn standard diesel fuels; they perform with the snap and ginger of a good gasoline engine. *Write for Bulletin* 1011—*a simple explanation of all Hesselman advantages.*



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HESSELMAN
ENGINES
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Contractors' Pneumatic Equipment

685 C-P portable compressors and pneumatic tools, including concrete vibrators, demolition tools, backfill tampers, rock drills, clay diggers and concrete surfacers, are described in Bulletin SP-1973, copies of which may be secured direct from the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.

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686 The Hayward Co., 32-36 Dey St., New York City will be glad to send to those interested complete information on its line of buckets, clamshell, dragline, electric motor or orangepeel, and make recommendations as to the right type of bucket for your particular job.

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687 Beebe Bros., 2724 Sixth Ave., So., Seattle, Wash., will be glad to send on request complete information on its 2, 5 and 15-ton all-steel hand hoists, features of which are the patent instant gear change and positive internal brake.

Tarpaulins and Road Mats

688 Complete information and prices on Fulton road mats for concrete curing, burlap and tarpaulins for use on construction jobs are contained in literature which the Fulton Bag & Cotton Mills, Atlanta, Ga., will be glad to send on request.

Versatile Power Tool

689 Literature describing the Mall power tool which vibrates concrete, surfaces it after the forms are removed and can be used for drilling, grinding and sawing by changing the attachment may be secured by those interested direct from the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill.

New Bucket Bulletin

690 A special bulletin describing the features of Williams Power-Arm, multiple rope power wheel, single line hook-on and dragline buckets may be secured direct from the Wellman Engineering Co., 7012 Central Ave., Cleveland, Ohio.

Oil-Burning Equipment

691 Aeroil equipment for construction jobs, including oil-burning kettles for tar, pitch and asphalt, emulsion distributors, power sprays, lead melting furnaces, weed burners and torches, is described in Bulletin No. 100-C which the Aeroil Burner Co., Inc., West New York, N. J., will be glad to send on request.

Stone Spreader Attachment

692 The Gibbes stone spreader attachment, designed for spreading crushed stone, gravel and similar material, and which is easily attached to any standard truck up to 2½-yard capacity, is described and illustrated in literature which the Gibbes Machinery Co., Columbia, S. C., will be glad to send on request.

Hydraulic Dirt-Moving Scraper

693 The Heil Co., Milwaukee, Wis., will be glad to send to interested contractors and state and county highway engineers complete information on Heil Dig-N-Carry scrapers, a feature of which is its hydraulic system for operating the scraper bowl.

A 10-Ton Motor Roller

694 Literature describing the Huber 10-ton motor roller, available attachments for which are the Tru-Plane high-compression and smoothing roll, scarifier, self-starter, electric lighting equipment, leveling blade and sprinkling device, may be secured by contractors and state and county highway departments from the Huber Mfg. Co., Marion, Ohio.

Placing Concrete by Pipe Line

695 Featured in a new bulletin on Rex construction equipment, which includes mixers, pavers, truck-mixers and agitators, and pumps, is the Rex 160 Pumpcrete, a new smaller unit for placing concrete by pipe-line on jobs of less than 5,000 cubic yards. Copies of this new bulletin No. 322 may be secured by those interested direct from the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis.

Leaning Wheel Graders

696 "Why I Like Adams Leaning Wheel Graders" is the title of an interesting booklet describing the construction features of Adams graders and containing many comments from owners on their operation. Copies may be secured direct from J. D. Adams Co., Indianapolis, Ind., on request.

Balanced Wheelbarrows

697 One of the features of Sterling wheelbarrows is that the greater part of the load is balanced over the wheel. Complete information on this line of wheelbarrows and on Sterling concrete carts may be secured from the Sterling Wheelbarrow Co., Milwaukee, Wis.

Pile Hammers and Extractors

698 McKiernan-Terry Corp., 19 Park Row, New York City, will be glad to send to those interested complete information on its line of pile hammers and extractors, hoists, derricks, whirlers and movable bridge machinery.

Heavy-Duty Trailers

699 Complete information on Jahn heavy-duty trailers in sizes to meet every requirement for material or machinery hauling may be secured from the C. R. Jahn Co., Builders Bldg., Chicago, Ill., by interested contractors and engineers.

3-Wheel Grader Bulletin

700 The Austin-Western Road Machinery Co., 1815 Barrows St., Aurora, Ill., has available to those interested Bulletin No. 1728 containing complete data on its 3-wheeled elevating grader with hydraulic controls.

Round-Nose Digging Bucket

701 Complete information on the Owen Type DX bucket designed with a round nose for more effective digging may be secured direct from the Owen Bucket Co., 6030 Breakwater Ave., Cleveland, Ohio.

Facts on Wellpoints

702 The features of the Griffin wellpoint system for drying up any excavation job are described and illustrated in an interesting booklet "Pointed Wellpoint Facts," copies of which may be secured from the Griffin Wellpoint Corp., 725 E. 140th St., New York City.

Line of Road Rollers

703 The Buffalo-Springfield Roller Co., Springfield, Ohio, will be glad to send to interested contractors and state and county highway engineers complete information on its line of 12 models of road rollers from 2 to 21 tons in size with gasoline or diesel power.

Repairs by Welding

704 The P & H-Hansen 150-ampere trailer welder for welding and repair work in the field, which is easily transported from job to job, is described in Bulletin W-6 which the Harnishfeger Corp., 4419 W. National Ave., Milwaukee, Wis., will be glad to send on request.

Asphalt Products for Roads

705 Complete information on Socony asphalt road oils, asphalt joint fillers, waterproofing asphalt, emulsions, and all types of asphalt for surface treatment, sheet asphalt paving, Binders B and C for penetration work, asphalt for asphaltic concrete, and cold patch asphalt for all types of patching may be secured by interested contractors and state and county highway engineers from the Standard Oil of New York Division, Socony-Vacuum Oil Co., 26 Broadway, New York City.

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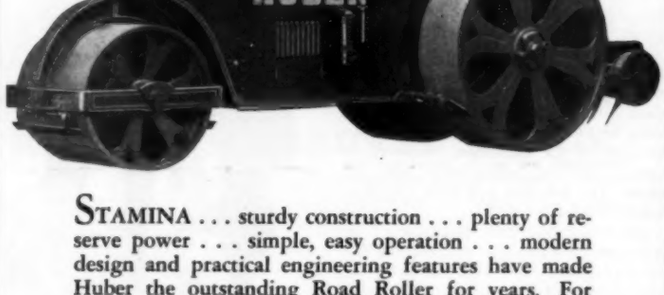

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Bulletins and Pamphlets

(Continued from preceding page)

Open-Mesh Bridge Deck

706 Open steel mesh pavement formed of Irving decking for bridges furnishes a non-skid pavement on which dirt cannot accumulate and which is safe for any kind of vehicular, pedestrian or animal traffic. Complete information will be found in a new 32-page catalog F-200, issued by Irving Iron Works Co., Long Island City, N. Y.

Insurance for Contractors

707 The advantages to the contractor from the use of American Mutual insurance, including consultation with safety engineers on policies as they relate to the safety of employees, the public and property, are outlined in an instructive folder which those interested may secure from the American Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass.

Pressure Distributor Bulletin

708 A new bulletin, which those interested may secure direct from Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, contains useful suggestions on how to select the Littleford distributor best suited for the type of work you do.

New Earth-Moving Unit Folder

709 Fast loading, easy hauling, and positive dumping are among the features of the new 15-yard Buggy announced recently by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., which is described and illustrated in a new folder. Copies may be secured direct from the manufacturer on request.

New Shovel Bulletin

710 The Thew Shovel Co., Lorain, Ohio, will gladly send to those interested its new folder containing illustrations showing the various applications of Thew shovels and outlining the advantages of Thew center-drive design.

New Tandem-Roller Bulletin

711 Catalog No. 220, fully describing and illustrating the details of construction and operation of the Galion variable-weight tandem roller, which according to the manufacturer has ample power and weight for any job, grade, and type of material, may be secured direct from the Galion Iron Works & Mfg. Co., Columbus, Ohio.

Hydraulic Dredge Accessories

712 The Morris Machine Works, Baldwinsville, N. Y. has recently issued a new bulletin, No. 172, describing and illustrating various pipe line parts and fittings, and equipment for hydraulic dredges, which it will gladly send to those interested on request.

Bulletin on Treated Timber

713 The advantages and economies of treated wood together with several rules for estimating the value of pressure treatment in various installations are contained in a booklet entitled "Pressure Treated Timber" which the Wood Preserving Corp., Koppers Bldg., Pittsburgh, Pa. will gladly send to those interested.

Aggregate-Handling Equipment

714 The Robins Conveying Belt Co., 17 Park Row, New York City, has recently issued a new bulletin, No. 103, describing and illustrating its line of material-handling equipment, including idlers for belt conveyor, belt conveyors, screens and complete plants, copies of which may be secured by those interested.

An All-Purpose Spreader

715 The Junior Model of the All-Purpose sand and chip spreader, which is self-powered and will spread amounts of material from 0 to 70 pounds per square yard in widths from 3 to 30 feet, is described in literature which the All-Purpose Spreader Co., Elyria, Ohio, will be glad to send on request.

Steam-Jacketed Pipe and Fittings

716 Bulletin S-12, covering H & B steam-jacketed pipe and fittings, may be secured direct from the manufacturer, Hetherington & Berner, Inc., Indianapolis, Ind., whose Engineering Department is available to assist you in laying out an efficient jacketed-pipe system.

A New Catalog on Steel Derricks

717 The American line of derricks, including stiffleg, guy, self-supporting, tower, and barge types, which, according to the manufacturer, are designed and built to meet the exacting demands of present-day high-speed material handling, is described and illustrated in Catalog D1-2 recently issued by the American Hoist & Derrick Co., St. Paul, Minn.

The New Bucyrus-Erie Oil Reclaimer

A New Oil Reclaimer

Savings in lubrication costs as well as additional economies in engine maintenance and fuel cost are claimed for the new oil reclaimer recently announced by the Bucyrus-Erie Co., South Milwaukee, Wis. Transformer oil, heat-treating oil and other fluid industrial oils can also be reclaimed with this unit.

Recovery of up to 90 per cent of average crankcase oil, with an overall cost of about 9 cents a gallon, is claimed for this new unit which departs from the conventional type of reclaimer in its process of reclaiming oil. The quality of the reclaimed oil is reported to be even better than that of the oil originally put into the engine because the weaker and unstable parts of the oil have been broken down by heat and friction in the engine and the wastes are removed by the washing and filtering process of the oil reclaimer.

Complete details on this reclaimer and the effect of reclaiming on oil are contained in an illustrated bulletin which the Bucyrus-Erie Co. will be glad to send to interested contractors and state county engineers on request.

Stresses in Concrete Piles During Driving

Technical Paper No. 20 "An Investigation of the Stresses in Reinforced Concrete Piles During Driving" has recently been published by the Department of Scientific and Industrial Research in Great Britain. This paper, which is the outcome of investigations started in 1932 by the Building Research Station and carried on with the cooperation of the Royal Institution of Civil Engineers, discusses the theory explaining stresses in piles during driving and contains charts and tables for the guidance of engineers in safeguarding the pile from excessive driving strains.

Copies of this paper may be secured from the British Library of Information, 270 Madison Avenue, New York City. Price: 95 cents.

Brick-Veneer Bridge

(Continued from page 1)

which cost a total of $57,560.00, allowing 10 per cent for engineering and contingencies, are as follows:

Major Quantities

Item	Quantity	Unit Price
Bridge excavation	800 cu. yds.	$1.50
Ledge excavation	70 cu. yds.	4.00
Concrete, Class A (1:2:3½)	749 cu. yds.	15.00
Concrete, Class B (1:1¾:3)	34 cu. yds.	65.00
Reinforcement, structure	149,000 lbs.	.03½
Bituminous waterproofing	630 sq. yds.	.30
Trench excavation	18 cu. yds.	3.00
Concrete, Class C (1:2:4)	1,735 cu. yds.	10.00
Bituminous concrete	114 tons	8.00
C. I. water pipe, 6-inch	49 feet	1.30
C. I. water pipe, 12-inch	50 feet	2.70
Cinder fill	60 cu. yds.	1.50
Structural steel	216,000 lbs.	.05
Windows	3	20.00
Sand traps, garage floor	3 traps	40.00
Manhole frame and cover	1	40.00
Rolling lift doors, installed	3 doors	40.00
Kalamein door	1 door	60.00
Membrane waterproofing	680 sq. yds.	1.60

Personnel

The contractor for the 3.950-mile highway and underpass project was E. H. Lewis of Andover, Mass., for whom Norman Scott was Superintendent. For the Massachusetts Division of Highways the work was in charge of J. F. McCarthy as Resident Engineer. The roadway project cost $914,440 and the bridge structure described above, $57,560.

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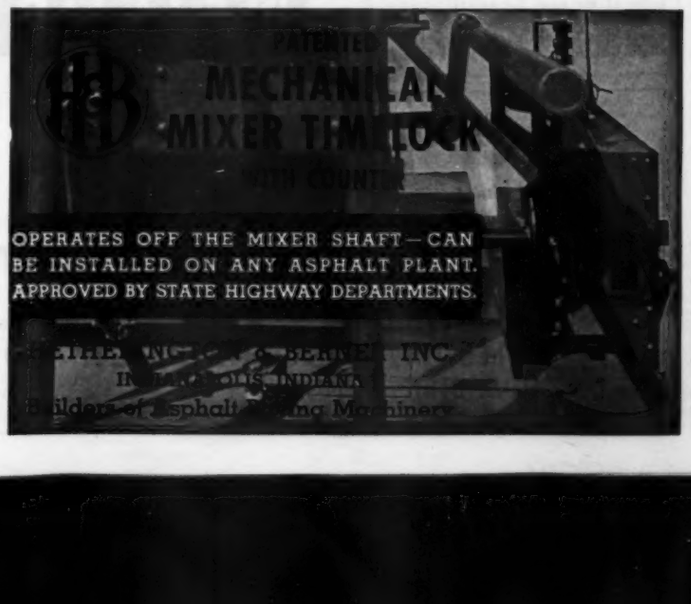
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Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law

"Sub's" Surety Not Released By Contractor's Acts

A subcontractor gave a surety bond to a contractor, guaranteeing the performance of subcontract. The subcontractor fell down on the job and the contractor completed the work, and then asked the surety to make good the resulting loss.

"Sorry," says Surety, "but you let me out of responsibility in two separate ways. Firstly, you didn't make the full amount of progress payments that the 'Sub' was entitled to. Maybe if you had paid him the full amount he would not have fallen down on the job. Secondly, you gave him notice that you were cancelling the contract and then let him go ahead again before the final cancellation. When you did that you virtually made a new contract with the subcontractor and that lets me out."

Then a lawsuit followed, in which the Texas Commission of Appeals decided (Southern Surety Co. v. American Construction Co., 36 S. W. 2d, 212) that the Surety must "come through"; that the surety company lawyers had failed to find a loophole through which the company could escape.

On the first point, the court decided that the contractor's failure to make the full amount of progress payments was waived by the subcontractor and that the latter's surety was not in a position to complain.

On the second point, the court said:

"The surety company claims that the notice which was given by the construction company, ...to the effect that the latter company had elected to complete the Lassig contract constituted an election which could not be recalled without the surety's consent; and that, because the construction company allowed Lassig to proceed thereafter in the performance of the work, a new contract between the two arose, and that the surety company stands released from the suretyship contract. The notice did not, in our opinion, constitute an irrevocable election. It was but a step towards the taking over of the work for the purpose of completing it, but the construction company proceeded no further in that direction at that time. Lassig was allowed to proceed further with the prosecution of the work. The construction company thus waived, as it had the right to do, its declared purpose to take over the work at that time, and complete it under the provisions of article 4 of the contract. The bare fact of this waiver did not work a release of the surety."

General Contractor Cleared

When vast masses of rock were blasted from a bluff on a road building job in Kentucky, they were supposed to stay within the highway limits, but escaped into an adjacent river. It was an easy way to get rid of the rock, but it so obstructed the channel of the river that a new channel was formed, to the injury of a nearby property owner. This landowner sued the general contractor for resulting damage, and won in the trial court. But the Kentucky Court of Appeals set the judgment aside and ordered a new trial, deciding that the subcontractor to whom the general contractor had sublet the job, and whose fault it was that the river was driven out of its bed, were the responsible parties, if any one was liable at all. (H. H. Miller Construction Co. v. Collins, 108 S. W. 2d, 663.) The Court of Appeals said:

"A contractor constructing a highway without negligence under the plans of the Highway Commission is not liable for damages resulting from the obstruction of the stream *on the right-of-way*, but he is liable for negligence in the performance of the contract or without negligence where the material blasted in the work of construction is cast *beyond* the right-of-way.

Because the contractors who caused the injury in this case were free of control of the general contractor, merely being bound to produce a road finished according to contract, it was decided that they were "independent contractors," within the rule of law that the employer of such contractors is not liable for their negligence.

Who Sold the Gravel?

Contractors can have taxes and smallpox thrust upon them without their consent, but not contracts. It is a fundamental principle of law that one cannot be regarded as having entered into an agreement with another unless he knows about it.

A Texas highway contractor contracted with the T. Sand & Gravel Co. for crushed stone and gravel. Deliveries were made by the H. Sand & Gravel Co., which later sued the contractor to recover the price.

When the suit was tried the witnesses arrayed on opposite sides of the case did not agree as to what were the circumstances under which the H. company furnished the road materials. A jury adopted the contractor's version—that he supposed that the H. company was making the deliveries under his contract with the T. company. The trial court accordingly dismissed the H. company's suit. The Texas Court of Civil Appeals upheld the dismissal. (Hearne Sand & Gravel Co. v. McKinney, 106 S. W. 2d, 1099.) Said the Court of Civil Appeals:

"The mere fact that the defendant received gravel that had been shipped directly from plaintiff's pit was not in itself sufficient to conclusively establish a contract between plaintiff and defendant, as alleged by plaintiff."

When Contractor Guarantees Sub Will Pay for Supplies

Written guarantees to pay obligations of others are no exception to the rule dictated by good business sense that one should weigh well the meaning of instruments about to be signed. And that includes letters as well as formal contracts.

"We will see that you get your money for feed and supplies that you furnish him," wrote a general road contractor to a retail mercantile firm. The firm later insisted that this guaranty covered goods that had already been furnished to "him," a subcontractor, as well as those furnished afterward. And the Oklahoma Supreme Court decided (Maney v. Cherry, 41 Pac. 2d. 82) that the merchants were right in this contention. The one word, "hereafter," inserted in the guaranty before the word "furnish" would have avoided this controversy.

But the general contractor won a point in the same case, under a separate guaranty that he would pay for "feed" furnished other subs. The merchants tried to stretch that word as covering groceries, etc., furnished the subs for their men, but the court ruled that "feed" covered only provender for the subs' horses, etc. Had the words "and supplies" been in this second guaranty, as they were in the first, the general contractor probably would have been stuck on the whole bill presented by the merchants.

An Elastic Law

Some laws are like toy balloons. They have so much rubber in them that they can be blown by judges into a small, medium or large sphere, according to varying notions.

Take, for example, the retail sales tax law of Arizona, lately passed upon by the Supreme Court of that state. The Legislature imposed a tax on "selling any tangible personal property whatsoever, except bonds and stocks."

The applicability of this law to a contractor for the construction of two steel bridges and approaches under a lump-sum contract was debated before the Supreme Court in the case of Moore v. Pleasant Hasler Construction Co., 72 pac. 2nd, 573. Two of the three judges of the court said that the law had enough elasticity to cover the contractor. The majority of the court followed the reasoning of the Illinois and Arkansas Supreme Courts, to the effect that a transaction under which a contractor furnishes labor and materials for a lump sum is as much a sale of the materials as where they are furnished under a construction contract stating separate prices for labor and materials.

Judge Lockwood was the dissenting member of the Supreme Court. He argued that it is just as unreasonable to say that a contractor is a seller of materials, when he attaches them to real estate to produce a structure, as it would be to rule that if a barber uses cosmetics on a patron he is a taxable dealer in cosmetics, or to rule that a bootblack is a seller of the paste he uses in shining shoes. Judge Lockwood thought that it would not do to say that in such cases the material used is slight in comparison with labor furnished, because that would mean that every case would have to be decided with reference to the proportions of labor and materials used.

The majority of the court ruled that under lump-price contracts the tax under the Arizona law is imposed on the full price without deduction for labor or services used in producing the completed structure; and that the fact that this was a state highway contract, under which the tax might ultimately fall on the state, did not defeat application of the law to the contract.

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SMITH Mixers
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OWEN—Clamshell Buckets
OMAHA—Dragline Buckets
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A. LESCHEN & SONS—Wire Rope
McKIERNAN-TERRY CORP.—Pile Hammers
LAMBERT-NATIONAL—Hoists and Cableways
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Koehring Co.
Kwik-Mix Concrete Mixer Co.
Lidgerwood Mfg. Co.
Master Vibrator Co.
Metal Forms Corp.
Northern Conveyor Co.
Parsons Co.
Rosco Mfg. Co.
Sterling Machinery Corp.
Sterling Wheelbarrow Co.
Wellman Engineering Co.

Member: Associated Equipment Distributors

CONTRACTORS WHITE SALES CORP.

P. O. Box 949 Albany, N.Y.

Representing

Allis-Chalmers Mfg. Co.—Tractors, Road Machy.
Jaeger Machine Co.
General Excavator Co.
Ingersoll-Rand Co.
The Osgood Co.
Baker Mfg. Co., Inc.
Headley Asphalt Co.
Hercules Roller Co.
Hough Universal Sweepers
Pioneer—Gravel Plants, Crushers

R. E. BROOKS COMPANY

"Serving the Contractor for over 25 years"

50 Church Street New York, N.Y.

Beach Mfg. Co.—Saw Rigs
Blaw-Knox Co.—Road and Sidewalk Forms, Bins, Batchers, Finishing Machines, Spreaders, Buckets
Cleaver-Brooks Co.—Tank Car Heaters, Boosters
Gorman-Rupp Co.—Pumps
Hug Co.—Trucks
Insley Mfg. Co.—Excavators, Concrete Chuting Plants, Buckets, Cars
Koehring Company—Pavers, Mixers, Shovels, Cranes, Mud Jacks
Kwik-Mix Mfg. Co.—Concr. Mixers
Master Vibrator Co.—Concr. Vibrators
Parsons Co.—Trench Machines
Pioneer Gravel Equipment
Rosco Mfg. Co.—Oil Distributors

Member: Associated Equipment Distributors

WM. H. ZIEGLER CO., INC.

Minneapolis, St. Paul, Duluth, Crookston, Minn.

"CATERPILLAR" — Tractors, Engines, Road Machinery
LAPLANT-CHOATE—Bulldozers, Snow Plows, Dump Wagons
LeTOURNEAU—Dirt Moving Road Equipment
KILLEFER—Road Rippers, Scrapers
ATHEY—Crawlers, Dump Wagons, Trailers
BUCYRUS-ERIE — Power Shovels, Cranes, Draglines
PIONEER—Crushers, Gravel Plants
REX—Mixers, Pavers, Mobile-Mixers, Pumps, Saw Rigs
BUTLER—Bins, Batchers
BARBER-GREENE—Conveyors, Loaders, Ditchers
F. W. D.—Four-Wheel Drive Trucks
PLYMOUTH—Locomotives
GARDNER-DENVER—Air Compressors, Drills
LESCHEN—Wire Rope
LITTLEFORD — Oil Distributors, Tar Kettles, Heaters
"WILLIAMS" — Buckets, Heavy-Duty Trailers
HYPRESSURE JENNY—Spray Cleaners
MADSEN—Asphalt Plants

Member: Associated Equipment Distributors

THE GEO. F. SMITH CO.

Franklin & Channing Aves., St. Louis, Mo.

Complete Plants Rented

Ingersoll-Rand—Compressors, Air Tools
Clyde—Hoists and Derricks
Owen—Clamshell Buckets
Rauch—Heaters
Seagen—Derricks & Winches
Skilsaw—Electric Saws, Drills
Skelton—Shovels
LeRoi—Engines
Symons—Column Clamps
Winslow—Weighing Scales
Universal—Form Clamps
Link-Belt—Cranes, Shovels, Draglines
Nova—Pumps
Vulcan—Steam and Drop Hammers
Waukesha—Engines
Mall—Vibrators and Grinders
Archer—Tower Equipment
Red Star—Wheelbarrows and Shores
Templeton, Kenly & Co.—Trench Braces, Jacks
Smith—Mixers, Pavers
Vail—Tie Wires and Tools
American Steel & Wire—Rope
Ramsey—Winches

Member: Associated Equipment Distributors

DOW & COMPANY, INC.

Court & Wilkeson Sts., Buffalo, N.Y.

Exclusive Distributors of

ADAMS—Leaning Wheel Graders
BARCO—Gasoline Hammers
C. H. & E.—Pumps, Hoists, Saw Rigs
FRINK—Snow Plows
HOUGH-UNIVERSAL—Sweepers
INTERNATIONAL—Tractors & Power Units
MOHAWK—"Hotstuf" Kettles, Burners
T. L. SMITH—Mixers, Pavers, Tower Pavers
THEW-LORAIN—Shovels, Cranes
UNIVERSAL-LORAIN—Shovels, Truck Cranes
WALTER—Snowfighters, Tractor Trucks
"WILLIAMS"—Buckets, Trailers
WILLIAMSPORT—Wire Rope
JOY—Snow Loaders
ARMCO—Corrugated Culverts
DeWALT—Woodworking Machinery
LITTLEFORD BROS.—Wheeled Rollers

Member: Associated Equipment Distributors

A. P. DIENST CO., Inc.

Contractors' Supplies

140th St. & 3rd Ave., New York, N. Y.

Distributors for

GREDAG Grease
TOLEDO Bull Frog Wheelbarrows
WYOMING Red Edge Shovels
DUFF Sewer Trench Braces
CURRY Wire Ties
KEYSTONE Grease

Telephone MOtt Haven 9-5430

BUBLITZ MACHINERY CO.

2305 Pennway, Kansas City, Mo.

Representing

Austin-Western Rd. Machy. Co.
Cleveland Tractor Co.
Jaeger Machine Co.
Lakewood Engineering Co.
Thew Shovel Co.
Barber-Greene Company
McKiernan-Terry Corp.
Whitcomb Locomotive Co.
Butler Bin Co.
"Williams"—Buckets and Trailers
Ames Baldwin Wyoming Co.
Red Star Products Co.
Seagen Derrick Co.
Schramm, Inc.
Electric Tamper & Equipment Co.
MacMillan Petroleum Corp.
Bethlehem Steel Co. (Williamsport Div.)

Member: Associated Equipment Distributors

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while checking over this directory will you please advise us, because it is our desire to keep it accurate and up to date at all times.

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Ave. New York

LLOYD G. ROSS

3090 Main St. Buffalo, N. Y.

Representing

Allis-Chalmers Mfg. Co.
Burch Spreaders
Coleman Trucks
General Excavator Co.
Hercules Roller Co.
Quick-Way Truck Shovels
Ross Snow Plows

Sale and Rent of All Kinds of Construction Equipment

J. C. HOUSTON

30 Church Street New York, N.Y.

Representing

BROWNING CRANE & SHOVEL CO.
HOISTING MACHINERY CO.

Warehouse

ELIZABETH, N.J.—L.V. R.R.

O. B. AVERY COMPANY

1325 Macklind Avenue St. Louis, Mo.

Exclusive Distributors of

AUSTIN Trenchers
HERCULES Rollers
BLAW-KNOX Bins, Buckets, Finishers, Forms
BRODERICK & BASCOM Wire Rope
CHAIN BELT Mixers, Pavers, Pumps
DEMPSTER Dumpsters
LaCROSSE Trailers
KEWANEE Conveyors
KOB Spreaders
LAMBERT-NATIONAL Hoists
McKIERNAN-TERRY Pile Hammers
NORTHWEST Shovels, Cranes & Draglines
PIERCE Rollers
R-S Spreaders
CEDAR RAPIDS Crushers
STANDARD Bituminous Distributors
SULLIVAN Compressors & Air Tools
VULCAN Locomotives

Member: Associated Equipment Distributors

NORTHWEST EQUIP. CO., Inc.

Box 1112 Great Falls, Mont.

Complete Line of Road Machinery and Contractors' Equipment

Representing

PIONEER Gravel Equip.
KOEHRING Mixers, Pavers, Shovels
INSLEY Concr. Towers
PARSONS Ditchers
PANTHER Oil, Grease
COLEMAN Trucks
GORMAN-RUPP Pumps
OWEN Buckets
SCHRAMM Compressors
MacWHYTE Rope
CLEVELAND Rock Drills

Steel Bridges and Traffic Treads, Fresnos, Plows, Scrapers, etc.

EUGENE F. VAN NAME

116 John Street Horseheads, N. Y.

Representing

ALLIS-CHALMERS—Tractors, Graders
AEROIL—Burners
ARMCO—Culverts
A-W—Traffic Tread
BAKER—Road Drags, Snow Plows, Bulldozers
C.M.C.—Wonder & Marsh-Capron Mixers
DIAMOND—Crushers, Conveyors, Screening & Washing Equip.
HUBER—Rollers
HOTCHKISS—Sidewalk Forms
JACKSON—Wheelbarrows
LANSING—Wheelbarrows
MILES—Concrete Block Machines
ROWE—Can't Drift Snow Fence
SWEET'S—Steel Posts
THEW-LORAIN—Shovels, Cranes
UNIVERSAL-LORAIN—Shovels, Trailers
WORTHINGTON—Compressors
WILLIAMSPORT—Wire Rope
WISCONSIN SPECIAL—Snow Plows

MAHONEY-CLARKE, INC.

Complete Line of Contractors' Equipment and Supplies.

217 Pearl Street New York, N.Y.

Representing

Riddell Graders
Richmond Tyncrus, Anchors
Ingersoll-Rand Air Compressors, Rock Drills, Pneumatic Tools
Gas, Electric, Pneumatic Concrete Vibrators
Pumps of all descriptions
Hotchkiss Road & Sidewalk Forms
Lansing Concrete, Mortar Mixers
Vulcan Pile Hammers, Extractors, Parts
Wiley Concrete Buckets
Temple Road Material Spreaders

Rental Service

CORBY SUPPLY COMPANY

3942-46 W. Pine Blvd., St. Louis, Mo.

Representing

AMERICAN—Flexible Metal Hose
BUNL CO.—Portable Air Compressors
CHAMPION RIVET CO.—Rivets and Welding Rod
DETROIT HOIST & MACH. CO.—Air and Electric Hoists
DeVILBISS CO.—Paint Spray Equipment
HARDSOCG WONDER DRILL CO.—Rock Drills and Paving Breakers
WM. H. KELLER, INC.—Paver Pneumatic Tools
MUNSELL—Air-Operated Concrete Vibrators
PANGBORN CORP.—Sandblast Equipment
PENNSYLVANIA—Air Compressors and Pumps
DAVID ROUND & SON—Chain Hoists
STAYNEW—Air and Pipeline Filters
N. A. STRAND & CO.—Flexible Shaft Equipment
VAN DORN—Electric Drills, Grinders and Buffers
VICTOR—Welding and Cutting Apparatus
WESTINGHOUSE—Arc Welding Equipment
GUSTAV WIEDEKE CO.—Tube Expanders

HEYNIGER BROTHERS

Sale *Contractors' Equipment* *Rent*

6th Ave. & F St., Belmar N. J.

Jaeger Mixers
Self-Priming Pumps
Diaphragm Pumps
Richmond Form Ties
Rubber Hose and Boots
Manila and Wire Rope
Expansion Joint
Screw Jacks
Air Compressors
Grass Mowers
Aeroil Torches & Kettles
Reinforcing Rods
Cement Waterproofing
Galvanized Rods and Bolts
Iron and Wood Blocks
Heavy Hardware

JOHN R. TINKLEPAUGH

LIVINGSTON NEW YORK

Br. Off. Route 9, Albany County, Newtonville, N.Y.

Representing

Cleveland Tractor Company
Gar Wood Industries, Inc.
York Modern Corporation
Oshkosh Motor Truck Mfg. Co.
Overhead Tractor Shovel Co.
Euclid Road Machy. Co.
Killefer Mfg. Co.
Maine Steel Products Co.

H. O. PENN MACHY. CO., INC.

140th St. & East River Bronx, N. Y.

Representing

CATERPILLAR Tractors and Accessories
LaPLANT-CHOATE MFG. CO.
ATHEY TRUSS WHEEL CO.
R. G. LeTOURNEAU, INC.
MARION Shovels, ¾-2 yds.
SPEEDER Shovels, ½-¾ yd.
DEERE Indus. Tractors
SMITH Mixers, Pavers
LaROI Compressors, Engines
HELTZEL Steel Bins, Forms
FRINK Snow Plows
MARLOW Pumps
KIESLER Buckets

Warehouse Stock—Service Station

Member: Associated Equipment Distributors

UNITED HOISTING CO., INC.

165 Locust Avenue
NEW YORK, N. Y.

Representing

Construction Machy. Co.—Concrete, Plaster & Mortar Mixers, Saw Rigs, Pumps, Hoists and Pneumatic Tired Concrete Carts
Independent Pneumatic Tool Co.—"Thor" Pneumatic Tools, Hand Saws, and Sump Pumps
Portable Machy. Co.—Portable and Stationary Belt Conveyors
Sterling Mfg. Co.—Wheelbarrows & Concrete Carts
Sullivan Machy. Co.—Compressors, Pneumatic Tools and Accessories
White Mfg. Co.—Concrete Vibrators, Grinders and Heaters

Member: Associated Equipment Distributors

SOUTHERN OHIO EQUIP. CO

169-171 W. Main St., Zanesville, Ohio

On Route 40

Phone 813

Distributors for

Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
General Excavator Co.
Schramm, Inc.
Cleveland Rock Drill Co.
Timken Roller Bearing Co.
D-A Lubricant Co.
Shook Mfg. Co.
Apollo Culvert Works
Slusser-McLean Co.
Williamsport Wire Rope

SERVICE SUPPLY CORPORATION

20th and Venango Sts., Philadelphia, Pa.

Representing

Bay City Shovels, Inc.—Shovels, Cranes, etc.
Blaw-Knox Co.—Clamshell Buckets
Chain Belt Co.—Mixers, Truck Mixers, Pumperete, Pumps, Saw Rigs
Chicago Pneumatic Tool Co.—Compressors, Air Tools
Drave Doyle Co.—Tubular Hoisting Towers
Hercules Company—Road Rollers
Cleaver-Brooks Co.—Const. Handling Machy., Excavators
Internat'l Harvester Co.—Indus. Wheeltype and Crawler Tractors
C. S. Johnson & Co.—Bins, Batchers, Cement Handl. Eq.
Littleford Bros.—Road Oil Distrs., Heating Kettles, etc.
McKiernan-Terry Corp.—Pile Hammers, Hoists
Nelson Iron Works—Loaders and Belt Conveyors
The Parsons Company—Trench Machines, Snow Plows
W. A. Riddell Corp.—Power Graders

Member: Associated Equipment Distributors

R. B. EVERETT & CO.

3112-18 Harrisburg Blvd. Houston, Texas

BLAW-KNOX Road Plant Equipment, Bins, Clam Shell Buckets
AMERICAN Hoisting Machinery
"P. & H." Gasoline Cranes
McKIERNAN-TERRY Pile Hammers, etc.
CONNERY Asphalt Equip.
CHAIN BELT Concrete Mixers, Saw Rigs, Pavers
NOVO Engines, Hoists, Pumps
"RED STAR" Wheelbarrows
SAUERMAN Cableways
BATES Wire Ties
PULSOMETER & NYE Steam Pumps
PATENT Safety Swinging Scaffolding
TRU-LAY Wire Rope
BUFFALO-SPRINGFIELD Road Builders
SULLIVAN Compressors
PORTABLE Conveyors
ETNYRE Asphalt Distrs.
FLYNN Surfacer
PAGE Dragline Buckets
MALL Vibrators

Member: Associated Equipment Distributors

THE SYRACUSE SUPPLY CO.

314 W. Fayette St. Syracuse, N. Y.

Warehouse 358 W. Jefferson St.

Atlas Powder Co.
Blaw-Knox Co.
Caterpillar Tractor Co.
Clyde Iron Co.
Goodyear Tire & Rubber Co.
Gorman-Rupp Co.
Gould's Pumps, Inc.
Hazard Wire Rope Co.
Ingersoll-Rand Co.
Johns-Manville (Bridge Flank)
Kilfeifer Mfg. Co.
Kenaring Co.
LaPlant-Choate Mfg. Co.
Insley Mfg. Co.
Parsons Co.
Universal Form Clamp Co.
Wickwire Spencer Steel Co.
Williamsport Wire Rope
Timken Roller Bearing Service & Sales Co.—Timken Bits & Rods
Iowa Mfg. Co.
R. G. LeTourneau, Inc.
Master Vibrator Co.
Hauck Heaters
Spencer Machinery Corp.

Member: Associated Equipment Distributors

CLYDE EQUIPMENT CO.

Contractors' Equipment and Supplies

Portland, Ore. Seattle, Wash.

Atlas Imperial Diesel Eng. Co.
Blaw-Knox & Western Pipe Corp.
Clyde Iron Works
Lincoln Electric Co.
Buffalo-Erie Co.
Geo. Haiss Mfg. Co., Inc.
Sauerman Brothers
Sullivan Machinery Co.
Kisser Mfg. Company
T. L. Smith Co.
Allis-Chalmers Mfg. Co.
Lufkin Company
Bosbo Bros.
Kohler Co.
Wm. Bros Boiler & Mfg. Co.
Smith Engineering Works

Member: Associated Equipment Distributors

J. JACOB SHANNON & COMPANY

1744—Sedgley Avenue—1744
PHILADELPHIA

Representing

T. L. Smith Co.—Concr. Truck Mixers, Pavers, Glass Mixers
Allis-Chalmers Mfg. Co.—Tractors, Graders
C. H. & E. Mfg. Co.—Pumps, Saw Rigs, Rollers, Hoists
Baker Mfg. Co.—Bulldozers Blade & V Type Snow Plows
John A. Roebling's Sons Co.—Wire rope, Fittings
Concrete Surfacing Machinery Co.—Berg Surfacers
Saugen Derrick Co.—Derricks and Winches
Schramm, Inc.—Air Compressors, Pneumatic Tools
Clyde Iron Works—Gas, Elec., Steam Hoists
Shannon—Derricks and Derrick Fittings
Iowa Mfg. Co.—Crushers, Conveyors & Asphalt Plants
David Round & Son—Chain Hoists & Winches
Blaw-Knox Co.—Dirt Movers, Bulldozers, Sheep's Foot Tampers
Gar Wood—Scrapers, Bulldozers
Richmond Screw Anchor Co.—Form ties

Member: Associated Equipment Distributors

PHILLIPS MACHINERY CO.

900 East Cary St. Richmond, Va.

Representing

Austin Machinery Corp.
Butler Bin Company
Clyde Sales Co.
Chicago Automatic Conveyor Co.
DeWalt Products Corp.
Jackson Mfg. Co.
Sauerman Brothers, Inc.
Chicago Pneumatic Tool Co.
Stephens-Adamson Mfg. Co.
Rogers Brothers Corp.
General Excavator Co.
Aeroil Burner Co.
Manitowoc Engineering Works
Broderick & Bascom Rope Co.
Chain Belt Company
Van Dorn Electric Tool Co.
Master Vibrator Company

Member: Associated Equipment Distributors

NORTH CAROLINA EQ. CO.

Williamston Raleigh Statesville

Aeroil Burner Company
American Cable Company
Buckeye Traction Ditcher Company
Buoyrus-Erie Tractor Eq.
Cleaver-Brooks Company
Cleveland Rock Drill Co.
DeWalt Products Corp.
Eagle Crusher Co., Inc.
Elgin Corporation
Euclid Road Machy. Co.
Fairbanks, Morse & Co.
Fairfield Engrg. Co.
Four Wh. Dr. Auto Co.
Gallion Allsteel Body Co.
Gallion Iron Wks. & Mfg. Co.
Good Roads Mach. Corp.
Holtzel Steel Form & Iron Company
Highway Trailer Co.
Frank G. Hough Co.
Internat'l Harvester Co.
Iowa Manufacturing Co.
Jaeger Machine Company
Jeffery Manufacturing Co.
The C. S. Johnson Co.
Kensington Steel Company
Jos. F. Kinsler Company
Kinney Manufacturing Co.
Northwest Engineering Co.
Page Engineering Company
Ingersoll-Rand Company
Wellman Engineering Co.

Member: Associated Equipment Distributors

HOWARD-COOPER CORPORATION

Portland — Seattle — Spokane — Twin Falls

Representing

Internat'l Harvester Co. (McCormick-Deering Industrial Tractors)
Barber-Greene Co.
Cleveland Rock Drill Co.
Marion Steam Shovel Co.
Hughes-Keenan Co.
Cleaver-Brooks Co.
The Jaeger Machine Co.
Nordberg Mfg. Co. (Symons Crushers)
McKiernan-Terry Corp.
Schramm, Inc. (Compressors)
Universal Power Shovel Co.
Speeder Machinery Corp.
Elgin Corp.
Good Roads Machy. Corp. (Crushers & Snow Plows)
Buda Co. (Diesel & Gas Eng.)
Baker Mfg. Co.
Walter Motor Truck Co.
Seagrave Corp.
B. F. Goodrich Rubber Co. (Fire Hose)
Winslow (Scales)
Hercules Company
Sterling Wheelbarrow Co.
Root Spring Scraper Co.
White Mfg. Co.
Erie Steel Const. Co.
J. D. Adams Co.

Member: Associated Equipment Distributors

WESTERN MATERIAL CO.

Aberdeen, Sioux Falls, Rapid City, S. D.

Anthony Loaders, Tools
Balderson Snow Plows
Barber-Greene Ditchers, Loaders
Bates Wire Ties
Buoyrus-Erie "Loadmaster" Butler Bins, Hoppers
Phillip Carey Exp. Joints
"Caterpillar" Equipment
Chain Belt Pump, Mixers
Clyde Sales Hoists
D-A Lubricants
Davey Compressors
Day Crushers
Harris "Russell" Road Equip.
Hester Fireline Plows
LaPlant-Choate Tractor Eq.
LeTourneau Dirt-moving Eq.
Littleford Heating Equip.
Manhattan Belting
Pioneer Crushing Plants
Slusser-McLean Scrapers, Fresnos
Sauls Stone Spreaders
Toro Mowers
Walter Motor Trucks
Williamette-Hyster Winches, Hysters
Athey Wagons
John Deere Indus. Tractors
Kilfeifer Fresnos, Scrapers
Culbeg Hoists
Heisey Snow Plows
Highway Trailer Earth Boring Mach.
Witte Dieselectric Plants

Member: Associated Equipment Distributors

WE WOULD LIKE TO HAVE YOU HELP US

keep this Directory of Dealers in construction equipment up to date. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Ave. New York

CAROLINA TRACTOR & EQUIPMENT COMPANY

S. Main Ext. Salisbury, N. Car.

Branch Office and Warehouse:
733-35 West Hargett St.,
Raleigh, N. C.

CATERPILLAR Tractors, Graders, Power Units
THEW Shovels, Cranes
LeTOURNEAU Carry-all Scrapers
BLAW-KNOX Steel Forms, Bins, Buckets, Trukmixers
LaPLANT-CHOATE Wagons, Bulldozers
DIAMOND Roll, Jaw Crushers
BARBER-GREENE Conveyors, Car Unloaders
LaCROSSE Trailers
ETNYRE Bituminous Distributors, Flushers
WONDER Mixers, Pumps, Hoists
GARDNER-DENVER Air Compressors, Drills
SLUSSER-MacLEAN Wheelers, Rippers, Frenos
GORMAN-RUPP Centrifugal Pumps
HERCULES Road Rollers

Member: Associated Equipment Distributors

GASH-STULL CO.

Chester Pennsylvania

Representing

MICHIGAN Power Shovels
UNIVERSAL POWER SHOVEL CORP.
OSGOOD COMPANY
TRACKSON COMPANY
SCHRAMM, INC.
ANTHONY COMPANY
FORDSON Tractors and Equipment

LOCOMOTIVES
HOISTS—SCRAPERS—WIRE ROPE
MANGANESE DIPPER TEETH

NIXON-HASSELLE COMPANY INC.

Contractors' Equipment
Chattanooga Tennessee

Representing

BLAW-KNOX Buckets, Forms
INGERSOLL-RAND Compressors, Jackhammers
MUNDY Hoists
AUSTIN-WESTERN Graders, Crushers, Rollers, etc.
BARBER-GREENE Loaders, Conveyors
NORTHWEST Cranes, Shovels
ARCHER Towers, Spouting Equipment
REX Mixers, Pavers, Pumps
CLETRAC Tractors
NEWPORT Culvert Pipe
VULCAN Gas Locomotives
JAHN Machy. Trailers
DOBBIE Derricks
HOUGH—"Universal" Road Sweeper
LIDGERWOOD Hoists
SYNTRON Hammers, Vibr.
EAGLE Crushers & Pulv.
FOUR WH. DRIVE Trucks
TIMKEN Detach. Bits
Also Wheelbarrows, Carts, Scalers, Cutters, Shovels, etc.

Member: Associated Equipment Distributors

CONSTRUCTION EQUIPMENT CO.

1118-1124 Ide Ave., Spokane, Wash.

Aeroil Burner Co., Inc.
American Hoist & Der. Co.
Archer Iron Works
Bates Wire Ties
Beebe Bros.
Blystone Mfg. Co.
Broderick & Bascom Rope
Buffalo-Springfield Roller Co.
Butler Bin Co.
Chain Belt Co.
Climax Eng. Co.
Concrete Surf. Machy. Co.
D-A Lubricant Co.
Detroit Graphite Co.
E. E. Dietz Co.
Duff-Norton Mfg. Co.
Fairbanks, Morse & Co.
Fate-Root-Heath Co.
Homestead Valve Mfg. Co.
Iowa Mfg. Co.
Kalamazoo Ry. Supply Co.
LaRoi Co.
Linde Air Products Co.
M. & M. Wire Clamp Co.
Mall Tool Co.
Niagara Mfg. Co.
Red Star Products Co.
Saugen Derrick Co.
Sheldon Mfg. Co.
Sterling Machinery Co.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Sunbeam Mfg. Co.
Templeton, Kenly & Co.
Thew Shovel Co.
Williamette Hyster Co.
"Williams" Buckets, etc.
Young Iron Works

Member: Associated Equipment Distributors

THE CLETRAC OHIO SALES CO.

E. 193rd Street and Euclid Ave.
Cleveland Ohio

Representing

THE CLEVELAND TRACTOR CO.—Crawler Tractors
THE DAVEY COMPRESSOR CO.—Air-Cooled Compressors
THE EUCLID ROAD MACHY. CO.—Crawler Wagons, Scrapers, Bulldozers
THE ISAACSON IRON WORKS—Power Scrapers, Trailbuilders
MAIN STEEL PRODUCTS CO.—Snow Plows
MEAD MORRISON—Winches
THE TRUCK ENGINEERING CORP.
D-A LUBRICANT CO.—Oil

EDELEN & BOYER COMPANY

Office and Warehouse: 236 North 23rd St. Philadelphia Penna.

Distributors of

General Shovels, Cranes
Multi Foote Pavers
Adnun Black Top Pavers
Holtzel Steel Forms, Bins
R-B Finegrader
Holtzel Finishing Mach.
Marsh Capron Mixers
Wonder Concrete Mixers
Marlow Centrifugal Pumps
Marlow Diaphragm Pumps
Chrysler Portable Air Compressors
New Haven Burlapped-Cotton Blankets
Hayward Clamshell Buckets
Huber Rollers
Archer Towers, Buckets
LaCrosse Tu-way Trailers
Burch Stone Spreaders
Saugen Derricks, etc.
Flory Hoists
R-B Power Subgrader
Miles Block Machines
Pulsometer Steam Pumps
Bay City Truck Cranes
Tru-Lay Steel Cable
Reynolds Constr. Furnaces
Jaakson Wheelbarrows, etc.

BROOKS EQUIP. & MFG. CO.

Knoxville 408 Davenport Rd. Tennessee

Representing

J. D. Adams Co.
Buoyrus-Erie Co.
Continental Roll & Steel Co.
Crucible Steel Co.
Drave-Doyle Co.
Foote Co., Inc.
Gardner-Denver Co.
Holtzel Steel Form & Iron Co.
Cincinnati Rubber Mfg. Co.
Hug Co.
Independent Pneu. Tool Co.
Jaeger Machine Co.
C. S. Johnson Co.
Linn Mfg. Corp.
Master Vibrator Co.
McKiernan-Terry Corp.
Owen Bucket Co.
Pioneer Gravel Eq. Mfg. Co.
Rosco Mfg. Co.

Member: Associated Equipment Distributors

BOEHCK EQUIPMENT CO.

2404 W. Clybourn St. Milwaukee, Wis.

Representing

Jaeger Machine Co.
Byers Machine Co.
LaRoi Co.
A. Leschen & Sons Rope Co.
Wellman Engineering Co.
C. S. Johnson Company
Corrugated Steel Sheet Piling Corp.
McKiernan-Terry Corp.
Homestead Valve Mfg. Co.
Saugen Derrick Co.
American Hoist & Derrick Co.
Jones-Superior Machine Co.
Construction Accessories, Inc.
Independent Pneumatic Tool Co.
Hercules St. Products Co.
Electric Tam. & Equip. Co.
Portable Machinery Company
Hauck Mfg. Company
Lima Locomotive Works
Red Star Products, Inc.

Member: Associated Equipment Distributors

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CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue New York

GILES & RANSOME

17th St. & Sedgley Ave., Philadelphia

"Caterpillar"—Tractors and Road Machinery
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General Excavator Co.—Shovels
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Iowa Mfg. Co.—Crushers
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McKiernan-Terry Corp.—Pile Hammers
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R-B Equipment Co.—Pinegraders
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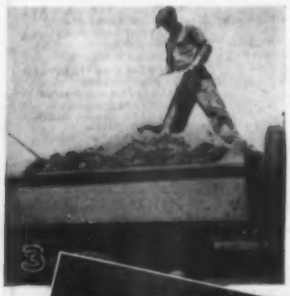
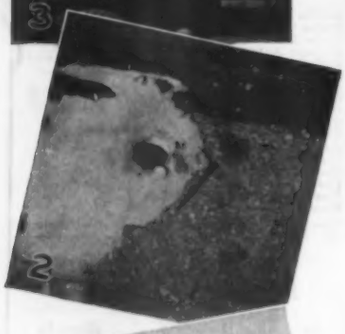
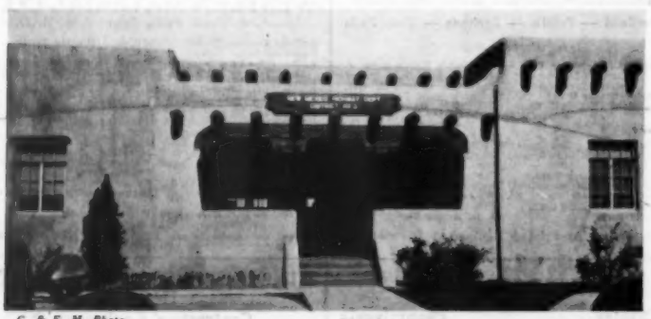




Steps in Missouri's Method of Raising Settled Concrete Pavements. See Page 2. 1. Two Core Drill Units Preparing the Holes. 2. A Completed Hole Ready for the Mud-Jack Hose. 3. Placing Cement with the Loam Prior to Dumping into the Mud-Jack Trailer. 4. Dumping the Cement and Loam into the Trailer. 5. The Hose and Nozzle in Place in the Drilled Hole. 6. A Mud-Jack in Operation. 7. The Mud-Jack Moving to the Next Location. 8. The Truck with Removable Ramp Track for Transporting the Core Drills.



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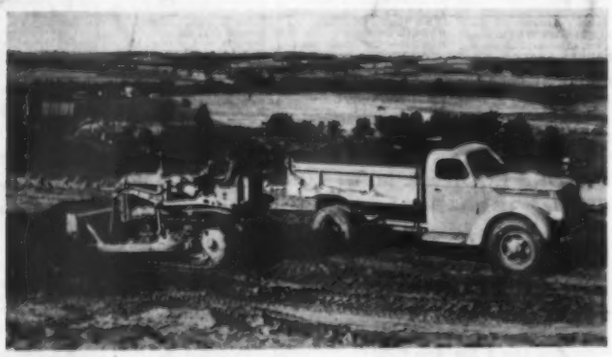
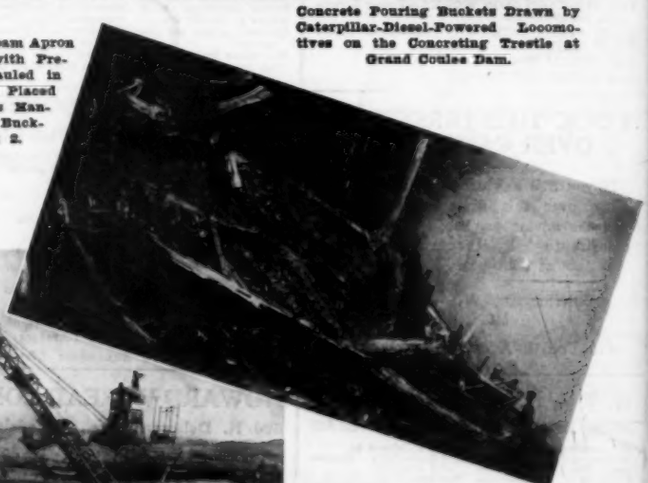
The New Mexico State Highway Department Office for District 3 in Albuquerque, Constructed in 1936 and Typical of the Architecture of the Southwest.

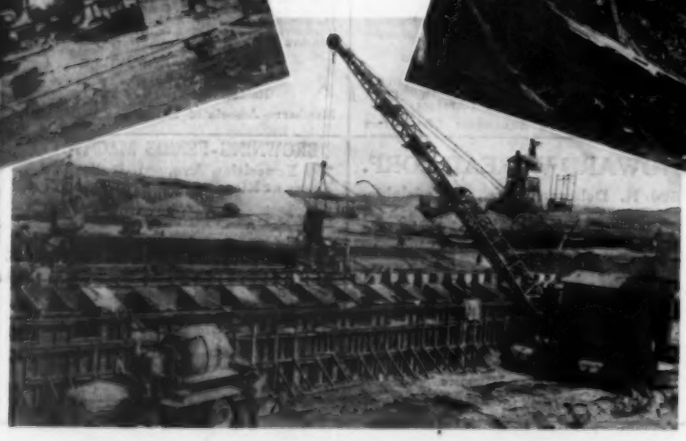


St. Croix County, Wis., Uses Its TracTracTor with Bucyrus-Erie Bulldozer and International Truck on a Road Job near Glenwood.

Concrete Pouring Buckets Drawn by Caterpillar-Diesel-Powered Locomotives on the Concreting Trestle at Grand Coulee Dam.

Pouring the Downstream Apron At Imperial Dam with Pre-Mixed Concrete Hauled in Truck Mixers and Placed by Two Draglines Handling the 2-Yard Buckets. See Page 2.





The Koehring 27-E Paver and Pumpcrete Which Mixed and Placed All Concrete for the McKeesport, Penna., Storm Sewer, for Which Freeland, Inc., Was the Contractor. See Page 15.

Yarding the Remains of Trees, Large and Small, to the Bottom of a Ravine for Complete Burning on the Houck Grading Contract for a Section of the Oregon Coast Highway. See Page 19.